Table of Contents

Figures

Tables

Appendix A - Letter from Duke Energy to Facility Employees, April 2002

ENVIRONMENTAL REPORT

1.0 INTRODUCTION

Proponent:

Duke Energy Grays Harbor, LLC, and Energy Northwest

Location of proposal:

The site is located approximately 0.5 miles southwest of the Chehalis River near the town of Elma. The 1600-acre Satsop Development Park surrounds the site on all four sides. Fuller Creek is approximately 0.5 mile to the east, and Workman Creek is located approximately 2 miles to the east.

The site is currently under construction for Phase I of the Satsop Combustion Turbine Project. To the north and northwest of the proposed site are various field offices, storage buildings, and stockpiled building materials. A 17-acre site located on the west side of Keys Road is currently being used for construction laydown, storage, parking and offices. To the south and east, respectively, are the BPA transmission line right-of-way and a strip of forested land. A fire water tank and pump house are located near the northeast corner of the site. (Figure 1.0-1)

Address of property involved:

401 Keys Road, Satsop, Washington.

Proposal:

Duke Energy Grays Harbor, LLC, and Energy Northwest (referred to collectively as the Certificate Holder) are proposing to expand the existing Satsop Combustion Turbine (CT) Project by constructing and operating a second phase similar to the permitted Phase I facility. As with Phase I, Phase II will consist of a combined-cycle electric generating plant that will generate approximately 650 MW to supply growing regional electrical demand. Phase II will be constructed on the Satsop CT Project site. The State of Washington previously approved a Site Certification Agreement (SCA) (Application 94-1). Phase II will be located entirely within the boundaries of the previously permitted site. As a result, the Certificate Holder is applying to the Energy Facility Site Evaluation Council (EFSEC) for an amendment to the existing SCA to allow construction and operation of Phase II. This amendment would be the fourth amendment to the SCA that was originally issued for the Satsop nuclear power plants.

Previous Documentation:

This environmental report supplements and for some environmental elements, supercedes the following documents prepared for the project:

- Satsop Combustion Turbine Project Phase II Submittal of Request for Amendment #4 to Site Certification Agreement, Application No. 01-03, November 19, 2001 (the "Application").
- Satsop Combustion Turbine Project Phase II SEPA Expanded Environmental Checklist, December 19, 2001 (the "SEPA Expanded Checklist").

Figure 1.0-1 Project Location

- Satsop Combustion Turbine Project (Phase I) Environmental Commitment Book, August 2001.

- Resource Contingency Program, Washington Final Environmental Impact Statement, Satsop Combustion Turbine Unit 1 Chehalis Generation Facility, November 1995.

Information that supercedes or supplements previously provided information includes the following:

- The amount of material to be excavated, graded or filled has been reduced from 80,000 cubic yards to 55,000 cubic yards. (Section 2.1.2)

- Additional air quality modeling has been performed using revised (higher) sulfur numbers. The air quality remains below the significance levels. (Section 3.2)

- The Certificate Holder is proposing to meet NPDES standards both for water quality and temperature at the end of the discharge pipe where it connects to the blowdown line. No mixing zone in the Chehalis River is proposed. (Section 2.2.4)

- Phase II water supply will be purchased from the Grays Harbor Public Development Authority. There are no plans to used stored water for Phase II, however stored water remains approved for Phase I. (Section 2.2.2)

- Phase II discharge water will not exceed the NPDES limits of 18 degrees C. As with Phase I, quench water will be used when possible to lower the discharge water temperature below 18 degrees C. (Section 3.3)

- The discharge water will enter the blowdown line at the edge of the property boundary. The water will be discharged at outfall 001. The outfall is a concrete box located in the middle of the Chehalis River and was designed with a series of diffuser pipes on the top of portals. Most of the diffuser pipes have been broken off by snags in the river, however the pipes are not required for either phase of the project as no mixing zone if proposed. The portals remain and will be used. (Section 2.2.4)

- Additional analysis has been provided on Chehalis River flow and the effect of water withdrawals on fishery resources. (Section 3.3)

- Additional traffic analysis for the construction workforce, construction truck traffic and proposed mitigation measures are provided. (Section 3.15)

2.0 DESCRIPTION OF PROPOSAL

The proposed Phase II expansion would consist of two gas turbines and one steam turbine, and have an estimated output of approximately 650 MW.

Phase II would be located within the previously permitted site, on land that has already been disturbed and developed for industrial use. The project would be fueled by natural gas, and no backup fuel source is proposed. Phase II would utilize the natural gas pipeline being installed for Phase I.

Power produced by Phase II would be routed through transmission lines that are being installed as part of Phase I and that would connect to the BPA system at BPA's Satsop substation. No new transmission lines would be required to serve Phase II.

2.1 Construction Onsite

2.1.1 Summary

The Phase II site was previously graded and covered with a layer of gravel to prepare the site for use as a construction storage area for the Phase I project.

After excavation, foundations would be installed, as would the drainage system for the construction stage. Materials used during construction are expected to be staged on the construction storage areas located adjacent to and west of the project site just west of Keys Road. During construction, the plant site would remain fenced to provide site security.

The Certificate Holder would purchase electricity needed for construction and startup. Approximately 1.5 megavolts (MVA) of 480-volt, 3-phase temporary power would be installed at a single location within the project site boundary. Startup power would be obtained by back-feeding from the 230-kilovolt (kV) utility system.

Conventional construction equipment, including bulldozers, front-end loaders, trucks, tractor-scrapers, and graders would be used to final grade the site. During construction, dust would be controlled as needed by spraying water on dry, exposed soil. Prior to leaving the site during construction, vehicles would be sprayed with water and required to drive over a gravel pad to remove mud from the tires.

Site clearing and grading has been completed during Phase I construction. Phase I construction erosion control measures would remain in place for Phase II construction in accordance with the requirements of the Certificate Holder's existing Erosion and Sedimentation Control Plan. The Erosion and Sediment Control Plan was approved by EFSEC on September 19, 2001.

After site preparation is completed, the Phase II contractors would install the combustion turbine, steam turbine, generators, electrical and other equipment. Once these facilities are in place, the site landscaping would be initiated.

Field toilets and temporary holding tanks would be placed on site for use by construction personnel. During construction, potable water from the water supply system would supply the contractor's needs. Parking would be provided on the construction laydown area located west of Keys Road.

2.1.2 Site Preparation

Approximately 55,000 cubic yards of material would be excavated for foundations, buried pipes (circulating water and fire loop), and the electrical duct banks. This material may be retained in the construction area west of Keys Road and later used for backfill.

A Phase I Environmental Site Assessment completed in April 1994 (Dames & Moore 1994) indicated that there is no evidence of contamination with hazardous materials at the site and that the likelihood of such contamination being present in subsurface soils is low. If contamination were encountered during excavation and grading, the Certificate Holder would notify EFSEC and take the appropriate remedial actions.

During site preparation, the Phase II contractor would install a storm drainage system. The system would consist of a series of swales that would convey surface water runoff into the existing Satsop Development Park storm drainage control system (see Section 2.10 of the Application).

A 6-foot-high enclosure (chain link fence) was constructed as part of Phase I surrounding the plant site to provide security, and would be maintained during construction of Phase II.

2.1.3 Foundations and Roadways

Foundations, including a pedestal for the steam turbine generator and foundations for the gas turbine generator and heat recovery steam generator equipment, would be installed. As a part of final design studies, geotechnical investigations would be conducted to determine the appropriate types of foundations for the facilities. Based on currently available data, the Certificate Holder anticipates that foundations would be Category 1 facilities (non-essential facilities) in accordance with ASCE document 7-88 ("Minimum Design Loads for Buildings and Other Structures"). Foundations and buildings would be designed for Seismic Zone 3.

Construction of the project foundations would require the use of a number of types of heavy equipment, including excavation equipment, concrete-pumping equipment, and concrete finishing equipment. In addition, light- and medium-duty trucks, air compressors, generators, and other internal combustion engine driven equipment are anticipated.

Onsite roadways and parking areas would be constructed with asphalt concrete over a compacted subbase.

An onsite concrete batch plant would not be required.

2.1.4 Equipment Installation

The combustion turbine, CTG, HRSG, STG, major pumps, and electrical equipment would be fabricated and delivered to the project site. Fabrication and delivery of these components would be scheduled to coincide with their requirement in the construction sequence. Heavy and large equipment components would be delivered to the site by truck. Various sized cranes would be required to lift and place many of the pieces of component equipment into the required position.

In sequence with the installation of component equipment, support systems would be installed, including electrical equipment, control equipment, piping instrumentation, wiring cable, and conduits. Typical construction activities on site would include mechanical fastening, welding, preparation, and painting.

Cathodic protection would be provided on all underground gas lines within the site boundary.

2.1.5 Startup Testing

At the completion of the construction sequence, the plant system would be energized and operational testing undertaken. This would include (1) testing each of the major component systems in a predetermined sequence and (2) completion of quality assurance and quality control checks to ensure that each system is ready for full operation. After the total plant is fully operational, emission compliance testing would be conducted. At the end of the startup testing phase, each unit would be separately certified for commercial operation. The quality assurance and quality control checks are described in detail in Section 2.12 of the Application.

2.1.6 Schedule and Milestones

Construction and final design of Phase II would be accomplished over a 22-month period, which begins at Construction Financial Closing. Prior to Construction Financial Closing, equipment specifications, and fabrication of major plant equipment will be initiated.

The date of initiation of construction would be dependent on the needs of the Certificate Holder's customers. Based on the anticipated permitting schedule, including the amendment to the Site Certification Agreement, construction could begin as early as October of 2002. The construction period is estimated at 22-months.

The majority of the site preparation work has been completed as part of Phase I. Following the engineering and design studies, construction activities would begin with the preparation of the site, which would include final grading and road construction. Site preparation is expected to take 3 months. Construction would generally occur 5 days per week (Monday through Friday), with a 10-hour workday (7 a.m. to 5 p.m.).

Site preparation would be followed by the installation of underground utilities and foundation work. As soon as possible after the completion of foundation work, the erection of the combustion and steam turbine generator trains and the heat recovery steam generator would begin. The cooling tower, pumps, transformers, mechanical and electrical and other equipment would be installed next.

2.1.7 Workforce

It is anticipated that the construction of the Phase II project may overlap with the construction of Phase I by approximately 8 months. The construction staff used for Phase I would transition to Phase II, as their crafts were no longer needed on Phase I. Figure 3.15-4 in Section 3.15 Traffic below graphically depicts the construction loading.

The peak workforce during the 22-month construction period would range from over 400 to over 500 construction personnel from about Month 12 through Month 17 of construction. During the construction phase there will be craft workers (welders, electricians, etc.) and non-craft workers (engineers, inspectors, etc.). As stated above, most if not all of these workers would come from workers hired for Phase I construction.

Craft workers would include the following: boilermakers, carpenters, cement finishers, electricians, equipment operators and oilers, fire sprinkler installers, laborers, millwrights, painters, pile drivers, pipefitters, plumbers, rodmen, structural steel workers, and, welders.

The estimated number of non-craft workers for the construction and start-up Phase Is based on the sum of project management staff needed by function plus the administrative staff (onsite construction inspectors and project engineers) associated with the anticipated volume of work.

2.2 Operation

Initiation of commercial operation for the plant would be dependent on the needs of the Certificate Holder's customers. If construction is initiated in October of 2002 immediately after the Certificate Holder obtains all required permits, the earliest anticipated date for the initiation of commercial operation is approximately mid-2004.

2.2.1 Energy Transmission Systems

The Phase II project will be fueled by natural gas that is supplied by the natural gas pipeline being constructed as part of Phase I, and thus not subject to this amendment. Also as part of Phase I, there would be new electrical transmission lines extending approximately 4,000 feet east of the plant site to the Bonneville Power Administration (BPA) Satsop substation.

Power produced by Phase II project would connect to the BPA system via the transmission lines constructed as part of Phase I. BPA's existing transmission line right-of-way is located south of and directly adjacent to the plant site and extends in an east-west direction. There are currently two 230-kilovolt (kV) transmission lines, both located on the same double-circuit structure. There is a separate 115-kV transmission line located on its own set of poles.

As part of construction for Phase I, the 115-kV line and its poles are being removed, and a new set of double-circuit structures are being installed. Three new transmission lines would be installed. Two of these lines would be 230-kV transmission lines. One line would be used to connect Phase I to the Satsop substation, and the other would remain idle until Phase II comes on line. The remaining line would be a 115-kV transmission line to replace the existing line.

The lines would be owned and operated by BPA. The Certificate Holder would coordinate with BPA to ensure that one of the new transmission lines constructed during Phase I is available to be tied in to the BPA substation when Phase II is ready for startup.

2.2.2 Water Supply System

The water supply system includes both process water and potable water.

2.2.2.1 Process Water Supply

Process water would be supplied from the existing Ranney wells and transported through the existing supply water line. The Ranney wells are located on the southern bank of the Chehalis River, approximately 4 miles downriver of the plant site near the river's confluence with Elizabeth Creek. The wells penetrate to a depth of approximately 120 feet into the alluvial aquifer associated with the Chehalis River. The Ranney wells obtain approximately 88 percent of their water from the Chehalis River via drawdown, with the remaining 12 percent drawn from groundwater in the surrounding river alluvium. Groundwater availability in river alluvium of the Chehalis River valley from each Ranney well is as high as 40 cfs (18,000 gpm). Additional information on water quality and quantity associated with the Ranney wells is presented later in the Environmental Report.

2.2.2.2 Potable Water Supply

Water for potable uses at the proposed project would be supplied by the Satsop Development Park's raw water well. The raw water well is located at the confluence of the Satsop and Chehalis Rivers, and the distribution pipeline extends to a water storage tank located adjacent to the northeastern corner of the plant site. The Certificate Holder would construct pipeline connections from this distribution system to the power plants.

Anticipated potable and service water demand for the Phase II is approximately 50 gpm maximum, and would average less than 20 gpm. Water supplied by the Satsop Development Park is chlorinated, and if needed, additional treatment would be made prior to delivery to Phase II.

2.2.3 System of Heat Dissipation

The proposed cooling system is identical to that being installed for Phase I and consists of two primary components: (1) a circulating cooling water system and (2) a mechanical draft cooling tower. Steam supplied to the steam turbine generators (STG) would be exhausted from the steam turbine and condensed in the steam condenser. The circulating cooling water system, operating at a flow of approximately 66,000 gallons per minute (gpm), would route cool water to the condenser and auxiliary cooling system. The auxiliary cooling system would provide cooling for the generator cooling circuit, boiler feed pump, sampling/analysis panel, and the lubrication oil cooling circuit. At the condenser and the auxiliary cooling system, heat would be transferred to the circulating water. The warmed water would then be routed to the cooling tower, where the temperature would be reduced, before being returned to the cooling system.

The cooling tower would continuously receive the heated cooling water from the plant. The heated water would enter the tower near the top and be sprayed downward through the tower. A large fan on top of the tower would pull air through openings in the bottom of the tower, moving air counter to the water sprays and cooling the water through evaporation. The temperature of the water would be reduced to approximately 90 degrees F when it reaches the cooling water basin where it would be collected and returned to the cooling system. This cycle would be repeated until the circulating water needs to be replaced as described below.

Evaporation in the cooling tower would result in a loss of cooling water, and the constituents of the cooling water would be concentrated due to evaporation. At high concentrations, some of these constituents could cause scaling in the heat exchanger surfaces. Therefore after cooling water has circulated through the cooling cycle the appropriate number of times, a small portion would be removed from the cooling tower basin and discharged in accordance with the NPDES permit. (This discharge is termed cooling tower blowdown.) To replenish the circulating cooling water, additional Ranney well water and the neutralized plant waste streams would be added to the cooling water. The wastewater streams are the cooling tower blowdown (of which the water treatment regeneration discharge and the HRSG blowdown are a part), and the plant sump discharge.

2.2.4 Characteristics of Aquatic Discharge Systems

The Phase II project will use the same blowdown line and outfall that Phase I will use, which discharges to the Chehalis River at river mile 20.5.

The existing blowdown line and outfall are owned by the Grays Harbor Public Development Authority. The transfer agreement between Energy Northwest and the Satsop Redevelopment Project guarantees the use of the blowdown line and outfall for Satsop CT Project discharges. Currently, there are no process discharges entering the blowdown line.

An existing NPDES permit governs wastewater discharges from the Satsop CT and stormwater discharges from the Satsop Development Park. This permit is currently being updated as required every five years. Effluent from the Phase II CT project would meet the stipulations of the revised NPDES permit.

Cooling tower blowdown would enter the Chehalis River at river mile 20.5 through an existing blowdown diffuser structure. The blowdown pipe is buried beneath the river bottom, and connects about 150 feet from the south river bank to a 30-foot-long multiport diffuser, which is also buried beneath the river bottom. The original design for the diffuser includes an 18-inch-diameter pipe perforated with 46 discharge ports (or nozzles) that project 1 foot above the river bottom and discharge in a downstream direction at a 12-degree angle above the horizontal. The ports are 2 inches in diameter and are spaced at 8-inch intervals. It has been determined that the diffuser structure has been damaged by snags catching on the discharge ports. The diffuser was originally designed to disperse the effluents as required to comply with the NPDES permit (No. WA-002496-1) by discharging water into a mixing zone. The Certificate Holder is proposing to comply with NPDES permit limits at the end of the pipe where it connects to the blowdown line, without a mixing zone. As a result, the diffuser function of the outfall is not needed. In its current condition, the diffuser remains functional as an outfall. Detailed information on the design, location, and construction, of the outfall is presented in documents previously submitted to EFSEC as a part of the application for the Site Certification Agreement for the nuclear projects and in subsequent related documents. As part of the Phase I startup, the outfall will be tested. Should any repairs be required, they will be done as part of the Phase I project. No additional modifications are needed for Phase II.

2.2.5 Wastewater Treatment

This section provides information on the proposed process wastewater discharge streams and wastewater treatment systems.

2.2.5.1 Process Wastewater Streams

The Satsop CT Project has been designed to minimize wastewater discharges, with only a single waste stream to be discharged from each phase. The design for each Phase Includes waste streams that would be treated as necessary and co-mingled prior to discharge. These waste streams consist of cooling tower blowdown and oil/water separator decant. The co-mingled waste streams from each phase would be discharged to the Satsop Development Park's blowdown line in accordance with the NPDES permit (Permit No. WA-002496-1) (as amended) for the Satsop CT Project.

<u>Cooling Tower Blowdown</u>. The cooling towers would continuously receive the heated cooling water from the plants. Heated water would enter the tower near the top and be sprayed downward through each tower. Evaporation in the cooling towers would result in a loss of cooling water, and the constituents of the cooling water would be concentrated due to evaporation. At high concentrations, some of these constituents could cause scaling in the heat exchanger surfaces. Therefore, after cooling water has repeatedly circulated through the cooling cycle, a small portion would be removed from each cooling tower basin and discharged in accordance with the NPDES permit.

Since the cooling water would be repeatedly circulated before being discharged, several of the constituents of the cooling water would be concentrated to a point that could result in corrosion. Therefore, an alkaline phosphate treatment would be necessary. Chemicals proposed for use in the cooling tower include an acrylic polymer (dispersant), tolytriazole (copper corrosion inhibitor), phosphonocarboxylate (iron corrosion inhibitor), phosphonate (iron corrosion inhibitor), and sulfuric acid (alkalinity control). Because the circulating water could be exposed to atmospheric microbiological contaminants, sodium hypochlorite would be used as a biocide to minimize microbiological growth. During treatment with sodium hypochlorite, the blowdown discharge valve would remain closed to prevent the release of chlorine. The majority of chlorine would dissipate from the cooling tower basin while the blowdown valve is closed. The retained wastewater would be sampled and analyzed prior to discharge as blowdown. If chlorine is detectable, sodium bisulfite would be added to dechlorinate the residual chlorine. As a result, chlorine would be at or below the detection level. However, if the Certificate Holder can demonstrate to EFSEC that the facility can not operate without a residual discharge, the monthly average free available residual chlorine may be 0.2 mg/L and the daily maximum may be 0.5 mg/L (see NPDES permit).

The types of chemicals used for treatment are listed in Table 2-1. The constituents of these chemicals used for treatment of the cooling tower water system are not on the list of toxic substances regulated under WAC 173-201A-040 (Water Quality Standards for Surface Waters in Washington State). The chemicals used for treatment of the cooling water would either be precipitated out of the effluent stream or would be at undetectable concentrations.

Table 2-1
Typical Chemicals Used in Cooling Water System (per unit)

Chemical	Description and Use	Estimated Usage Rate (pounds per day per unit)
Nalco - Dynacool - 8301D or equivalent (dispersant: acrylate polymer)	Liquid polymeric dispersant used in circulating water treatment system.	58
Nalco - Dynacool - 8308 or equivalent (corrosion inhibitor: phosphonate, phosphonocarboxylate, tolyltriazole)	Liquid phosphate-based corrosion inhibitor used in circulating water treatment system.	116
Sodium hypochlorite	Liquid water treatment chemical for the cooling tower.	111
Sulfuric acid	Liquid water treatment chemical used in demineralizer and in neutralization tank.	335

The cooling tower blowdown water from each phase would be co-mingled with the waste stream from each phase's oil-water separator and discharged to the blowdown line to the Chehalis River. The expected flow would be a maximum of 640 gpm for each phase.

Discharges through the blowdown line and outflow structure are regulated by the NPDES permit, which would be amended to include Phase II. As described below, the cooling tower discharge would meet the limitations of the NPDES permit and would be in compliance with applicable state water quality criteria (WAC 173-201A). The temperature of the discharge would be below the 18oC specified in the NPDES permit, using either heat exchangers and/or quench water.

Oil-Water Separator. The oil-water separator would be designed to produce an effluent concentration of less than or equal to 15 ppm of oil. The oil-water separator would be provided for waste streams that potentially may contain oily water such as the steam turbine oil purification system and floor and equipment drains. The oil-water separator would receive and separate water and oil mixtures. Water from the separator would be co-mingled with the cooling tower blowdown prior to discharge to the Satsop Development Park's blowdown line, while the oil is retained for eventual removal and disposal. The oil-water separator would be a prefabricated modular fiberglass reinforced plastic, cast-in-place concrete structure, or a packaged steel tank type system. The discharge piping would be designed with a leg extending below the maximum design oil depth, which would allow only oil-free water to be discharged. A reservoir included with the oil-water separator would collect the waste oil for off-site recycling or disposal by a licensed contractor.

Large tanks containing oil would be diked and valved to "retain-in-place" any large oil spills for mitigation and cleanup in place.

Sanitary Wastes. Sanitary wastes will be treated at onsite septic tank systems constructed and operated in accordance with the applicable state and Grays Harbor County codes.
HRSG Blowdown (Internal Stream). A small stream (90 gpm) from the HRSG of each phase would be drained to remove the constituents of the make-up water that become more concentrated due to evaporative losses during operation (steam production). This blowdown from the HRSG will be routed to a blowdown tank before being piped to the cooling tower for use as make-up water. The purpose of the tank is to absorb the "flashing" (the rapid and forceful decrease in temperature and pressure during blowdown release) as blowdown water is released from the boiler.

Regeneration Waste (Internal Stream). Approximately 8 gpm of regeneration waste would be discharged from the boiler feed water treatment system to the cooling tower basin.

Plant Sump Discharge (Internal Stream). Each plant sump would receive minor wastewater streams from the steam turbine oil purification system, the transformer containment structure drains, and the generator building floor drains. Wastewater in the plant sump would be routed to an oil-water separator.

2.2.6 Workforce

Operation of the project would involve approximately 22 employees working either two 12-hour shifts or three 8-hour shifts, with a maximum of 26 employees working on site at any time. The operational labor force would include the following positions: plant manager, operations supervisor/engineer, control operators, auxiliary operators, maintenance supervisor, mechanical and electrical technicians, and clerks. Efforts would be made to hire local individuals to staff the project as much as practicable. After the load needs of the Certificate Holder's customers are identified, the Certificate Holder will select the most appropriate number of shifts to meet the power needs. The two possible shift schedules currently under consideration for each unit are:

Two 12-hour shifts:	26 people working from 6:00 a.m. to 6:00 p.m.
	4 people working from 6:00 p.m. to 6:00 a.m.
Three 8-hour shifts:	26 people working from 8:00 a.m. to 4:00 p.m.
	4 people working from 4:00 p.m. to 12:00 a.m.
	4 people working from 12:00 a.m. to 8:00 a.m.

Major maintenance is expected to take place in Year 6 of operation. During this work, 50 additional people would be on site for 28 days during the day shift.

3.0 ANALYSIS OF ENVIRONMENTAL EFFECTS

The project will not have a significant environmental effect on the following environmental elements: Earth, Air Quality, Water (Quality and Quantity) Plants, Animals, Energy, Environmental Health, Land and Shoreline Use, Housing, Light and Glare, Aesthetics, Recreation, Historic and Cultural Preservation, Operation Traffic and Transportation, Public Services, and Utilities. The following sections address the environmental elements. (See also the Application for Amendment 4 to the Site Certification Agreement for the Satsop Combustion Turbine Project Phase II, submitted to the Washington State Energy Facility Site Evaluation

Council, November 2001, and the Satsop Combustion Turbine Project Phase II SEPA Expanded Environmental Checklist, December 2001, for additional information and analysis.)

The project may have a potential to cause a significant environmental effect on the following environmental elements, however the proposed mitigation measures will result in an elimination or reduction of the impacts to below significance levels: Noise and Construction Traffic and Transportation. A description of the analysis is provided in the following pages.

3.1 Earth

The site was originally cleared as part of construction of the Satsop Nuclear Plant, and has been graded for the construction of Satsop Phase I. The construction of Phase II will include the removal and replacement of up to 55,000 cubic yards of materials. Suitable materials may be retained on site and used as backfill. The unsuitable materials will be deposited in an approved site, and the fill will come from local borrow pits with suitable materials. Erosion control measures are in place, will be continued to be used for the construction of Phase II, and have been shown to be effective during the construction of Phase I. The site is located in Seismic Zone 3 and the Certificate Holder has committed to designing and constructing the buildings according to Uniform Building Code Standards for Zone 3.

3.2 Air Quality

3.2.1 Greenhouse Gases

Currently, there are no international, national, state, or local regulatory limits on greenhouse gas emissions. Regardless, it is acknowledged that greenhouse gas emissions from the Satsop CT Phase II project could pose an environmental concern.

3.2.1.1 Regulatory Framework

There are currently no regulations on greenhouse gas emissions specified by international, federal, state, or local rules. The U.S. signed the internationally negotiated Kyoto Protocol in 1999, agreeing with the other signatory nations on the overall objectives of the Protocol and agreeing with its specified emission reductions. The Protocol would commit the developed nations of the world to reduce their greenhouse gas emissions by an average of about 30 to 40 percent by the year 2012.

Although all of the signatory nations agreed to the overall objectives of the Protocol, this does not mean that it has become international law. The Protocol would be enacted and would obtain international law status only if at least 55 nations responsible for at least 55 percent of global greenhouse gas emissions ratify individual treaties to specify emission tracking and international enforcement. President Bush has indicated he will not sign a ratification treaty for the Kyoto Protocol. However, the Protocol would become international law even without U.S. ratification if a sufficient number of the remaining nations ratified their own treaties.

3.2.1.2 Recent Global Warming Research

The issue of how emissions from human activities may affect the global climate has been the subject of extensive international research over the past several decades. The most recent report by the United Nations Intergovernmental Panel on Climate Change (IPCC) concludes that the concentrations of greenhouse gases in the atmosphere continue to increase as a result of human activities, and that there is strong evidence that these greenhouse gases are contributing to global warming. (IPCC 2001a). The National Academy of Sciences has generally agreed with the IPCC's conclusion that greenhouse gases are accumulating in the atmosphere as a result of human activities and that they are causing surface air temperature to rise. (NAS 2001.)

Although human activity may affect global climate, there is significant disagreement regarding how much global warming may occur and what the consequences may be. (Montgomery 2001b.) The time frames in which climate change may occur are also quite long, allowing considerable flexibility to develop appropriate and cost-effective policy solutions. (Charles River Associates 2002.)

In 1999, nationwide annual greenhouse gas emissions totaled approximately 6746 million metric tons of CO_2 equivalent. (EPA 2001.) Annual greenhouse gas emissions in Washington State total approximately 92 million metric tons of CO_2 equivalent. (OTED 2001, Kerstetter 1999). In Washington, about 75% of the total greenhouse gas emissions are attributable to the combustion of petroleum products, the vast majority for transportation. (OTED 2001).

To the extent that electricity demand is met by fossil fuel-fired generation, the use of electricity results in the emission of greenhouse gases. However, different types of electrical generating technologies produce different amounts of greenhouse gases per kilowatt-hour of electricity generated. In the United States, coal-fired generation produces an average of 2.10 lbs. of CO_2 per kWh, oil-fired generation produces an average of 1.97 lbs. of CO_2 per kWh, and natural-gas fired generation produces an average of 1.32 lbs. of CO_2 per kWh. (DOE/EPA 2000.) Electricity generated by nuclear, hydroelectric or wind technologies does not result in the emission of greenhouse gases.

In Washington, electricity demand is met through a combination of hydroelectric generation, nuclear generation, coal-fired generation, natural gas-fired combined-cycle and simple cycle generation, oil-fired generation, and wind turbines. (OTED 2001.) Electricity demand varies from season to season, from day to day, and between hours within each day. Over time, however, electricity demand is growing.

The amount of greenhouse gases resulting from electricity consumption in Washington depends upon the amount of electricity consumed and the type of generation facilities used to produce the electricity. (DOE/EPA 2000.) Existing hydroelectric and nuclear generation is fully utilized, and relatively little electricity will be generated by wind power in the foreseeable future. As a result, a substantial amount of existing demand and virtually all future demand will be met by fossil fuel-fired generation.

The continued growth in electricity consumption will result in increased greenhouse gas emissions, unless existing and future electricity demand is met by more efficient generating resources that produce less greenhouse gases per unit of electricity produced. For this reason, virtually every major authority on global warming recommends the increased reliance on more efficient energy generating technology. In particular, they advocate increased reliance on the technology used in the Phase II project – natural gas-fired combined cycle combustion turbine generating technology – as a critical near term strategy for reducing greenhouse gas emissions. (IEA 2001; DOE/EPA 2000; EAI 1998; Montgomery 2001) The IPCC, for example, concluded that, in the near term, increased reliance upon natural gas and combined cycle technology "will play an important role in emission reduction." (IPCCb.)

3.2.1.3 Environmental Effects of the Proposed Project

Operation of the Phase II Satsop Facility will produce greenhouse gas emissions. If the facility operated at 100% capacity, 24 hours a day, 365 days per year, it would produce approximately 2.4 million tons of CO_2 per year. This means it would produce CO_2 emissions at a rate of approximately 0.84 lbs. per kilowatt-hour of electricity generated.

In practice, a 100% capacity factor is unrealistic. Operating at about 93% capacity is the most one would expect to achieve on a long-term basis, if market economics justified operating to the fullest extent possible. Market conditions over time will determine capacity utilization.

Whether or not operation of the Phase II facility will result in an increase in overall greenhouse gas emissions depends upon how its greenhouse gas emission rate compares to those of the generating facilities that would otherwise be satisfying the same electricity demand. If the Phase II facility operates instead of other fossil fuel generating facilities, it would have a positive effect on overall greenhouse gas emissions; but if it operates instead of hydropower, it would have a negative effect. (Jones & Stokes 2002.) Given the economics of power production in the Northwest, the Phase II facility is expected to operate instead of less-efficient oil- and gas-fired generating facilities, including small generators or turbines, simple cycle peaking plants, and less efficient combined-cycle facilities. (Montgomery 2001)

Therefore, relative to the no-action alternative, the Phase II facility is not expected to increase overall greenhouse gas emissions. If the Phase II facility were not constructed and operated, the existing and future electricity demand that would be generated by the Phase II facility would be generated either by other less efficient fossil fuel-fired facilities or by comparable new facilities. Thus, the Phase II facility would operate to meet existing and future electricity demand with either lower greenhouse gas emissions than would otherwise be produced or an equivalent amount of emissions. The Phase II facility, therefore, is expected to have a positive or neutral affect on global warming, and does not have a potential to result in significant adverse effects on the environment with respect to global warming. (Jones & Stokes 2002)

3.2.2 Sulfur Emissions

Over the past year, some questions arose over the actual sulfur content of natural gas being delivered to western Washington from Canada. Traditionally, a value of 0.2 grains of sulfur per 100 standard cubic feet (scf) of natural gas has been used to develop emission rates for sulfur dioxide and sulfate particulates from gas-fired turbines. This value has been in use for many years and has been substantiated with grab samples of natural gas that were analyzed for sulfur content. In more recent years, however, significantly higher sulfur content values have been being recorded at the Sumas entry point for natural gas arriving from Canada. As it turns out, the natural gas supplier's gas chromatograph which monitors sulfur content had not been calibrated since it's installation due to a miscommunication between the vendor and the user. Without regular calibrations, the data recorded from the gas chromatograph would be very inaccurate. Additionally, concerns arose over whether an inoperable Solex plant in British Columbia and maintenance downtime of sulfur treatment plants would significantly affect the sulfur content of the Canadian gas.

With input from Ecology, the facility's Phase I and Phase II emissions re-modeled based on higher sulfur content values as follows. The facility was modeled with a value of 0.5 gr S/100 scf for the annual and 24-hour averaging periods except that during May 15 - July 15 the sulfur content was increased to 3.0 gr S/100 scf to account for the 30 day maintenance period that occurs each late spring/early summer at the treatment facility in Canada. As the 30 day period is not the same each year, the two month period that could encompass the 30 day period was analyzed. The 1-hour and 3-hour sulfur content was established at 1.3 gr S/100 scf based on the highest three-hour spike seen since August 2001 when the gas chromatograph at Sumas was re-calibrated.

Table 3.2-1 below provides a summary of the ambient air quality modeling results shown in the Application and the new results from using the higher sulfur content values. Bear in mind that the maximum concentrations from the modeling summarized in the application are due primarily to the diesel generator emissions which are not affected by increased sulfur levels in natural gas. Also, worst-case meteorological conditions are not persistent during the May 15 – July 15 time period or worst-case sulfur content. The revised modeling using the higher sulfur content values predict no exceedances of any ambient air quality standard by the project and all predicted ambient air quality impacts remain below the significant impact levels established by EPA.

Table 3.2-1
Air Quality Modeling Results and Significant Impact Levels

Pollutant	Maximum Ambient Impact Concentration ($\mu g/m^3$) based on 0.2 gr S/100scf	Maximum Ambient Impact Concentration ($\mu g/m^3$) based on new sulfur content data	Significant Impact Levels ($\mu g/m^3$)
SO_2 Annual	0.29	0.29	1
SO_2 24-hour	1.52	3.50	5
SO_2 3-hour	6.14	13.54	25
SO_2 1-hour	10.93	40.43	--
PM10 Annual	0.91	0.91	1
PM10 24-hour	4.86	4.86	5

In addition to potential impacts on ambient air quality standards, higher sulfur content in natural gas has the potential to impact regional haze and other Air Quality Related Values.

Table 3.2-2 presents the revised Class I Increment analysis results. Maximum predictions remain below both the EPA and FLM proposed criteria.

Table 3.2-2
Calpuff Class I Increment Analysis Results

Class I Area	Maximum Concentration Predictions ($\mu g/m^3$)					
	NO_2 Annual	SO_2			PM_{10}	
		Annual	24-hr	3-hr	Annual	24-hr
Mt. Rainier National Park	0.00137	0.00061	0.01431	0.08065	0.00491	0.08018
Goat Rocks Wilderness	0.00072	0.00028	0.00787	0.06194	0.00267	0.04665
Mt. Adams Wilderness	0.00043	0.00023	0.00448	0.02047	0.00251	0.03262
Mt. Hood Wilderness	0.00022	0.00023	0.01210	0.02856	0.00243	0.05793
Olympic National Park	0.00782	0.00102	0.03180	0.25628	0.00952	0.23331
Alpine Lakes Wilderness	0.00157	0.00079	0.02175	0.05472	0.00637	0.09167
Glacier Peak Wilderness	0.00093	0.00040	0.01099	0.03349	0.00341	0.04689
North Cascades National Park	0.00065	0.00021	0.01237	0.03787	0.00182	0.04705
Pasayten Wilderness	0.00032	0.00009	0.00561	0.01749	0.00077	0.02238
EPA Proposed Class I SIL	0.10	0.10	0.20	1.00	0.20	0.30
FLM Proposed Class I SIL	0.03	0.03	0.07	0.48	0.08	0.27
Class II Area of Interest						
CRGNSA (All Areas)	0.00092	0.00058	0.01953	0.04249	0.00547	0.08329
Mt. Baker Wilderness	0.00102	0.00032	0.00981	0.02724	0.00275	0.05337
EPA Class II Significance Level	1.00	1.00	5.00	25.00	1.00	5.00

Note: All NOx conservatively assumed to be converted to NO2. PM10 concentrations include sulfates and nitrates. Emissions based on continuous operation with supplemental duct firing.

As with the previous analysis, while existing background levels may be of concern, the CALPUFF modeling analysis predicts the proposed project will not significantly add to nitrogen or sulfur deposition in the Class I areas. Table 3.2-3 presents the results of the revised deposition analysis.

Table 3.2-3
Calpuff Annual Deposition Analysis Results

Class I Area	Total Annual Wet Plus Dry Deposition							
	Nitrogen Deposition (kg/ha/yr)				Sulfur Deposition (kg/ha/yr)			
	SCTP	Back	Total	Change	SCTP	Back	Total	Change
Mt. Rainier National Park	0.0013	2.40	2.4013	0.0521%	0.0008	3.10	3.1008	0.0270%
Goat Rocks Wilderness	0.0007	9.00	9.0007	0.0075%	0.0004	11.80	11.8004	0.0036%
Mt. Adams Wilderness	0.0004	9.00	9.0004	0.0048%	0.0003	10.80	10.8003	0.0028%
Mt. Hood Wilderness	0.0003	5.40	5.4003	0.0055%	0.0003	8.60	8.6003	0.0030%
Olympic National Park	0.0062	2.00	2.0062	0.3096%	0.0047	5.60	5.6047	0.0844%
Alpine Lakes Wilderness	0.0026	5.20	5.2026	0.0501%	0.0019	7.20	7.2019	0.0269%
Glacier Peak Wilderness	0.0020	5.80	5.8020	0.0336%	0.0014	8.00	8.0014	0.0170%
North Cascades National Park	0.0015	4.00	4.0015	0.0372%	0.0009	3.50	3.5009	0.0245%
Pasayten Wilderness	0.0006	5.20	5.2006	0.0116%	0.0003	7.20	7.2003	0.0045%
USFS Level of Concern			5.0				3.0	
Class II Area of Interest								
CRGNSA (All Areas)	0.0006	9.00	9.0006	0.0063%	0.0004	10.80	10.8004	0.0041%
Mt. Baker Wilderness	0.0022	5.80	5.8022	0.0375%	0.0013	8.00	8.0013	0.0165%

Note: Emissions based on continuous 100% load operation with supplemental duct firing. Nitrogen deposition includes ammonium ion.

Table 3.2-4 presents the revised regional haze analysis results. Emissions from the Satsop CT Project are predicted to change background extinction by more than five percent on three days in Olympic National Park and one day in Mt. Rainier National Park. This is one more day than the previous analysis using lower sulfur content natural gas. This analysis did not consider whether meteorological conditions causing the greatest impacts actually coincide with good "natural" background visibility. Background aerosol concentrations will likely be higher and fog, low clouds, precipitation and other obscuring weather phenomena may reduce visual ranges so in some instances the impacts of the sources considered in this analysis would not be perceptible.

Table 3.2-4
Calpuff Regional Haze Analysis Results

Maximum Change to 24-hour Background Extinction									
		Bext (1/Mm)			Del Bext		Bext by Component (1/Mm)		
Class I Area	Date	SCTP	Back	Total	(%)	F(RH)	$bxSO_4$	$bxNO_3$	bxPMF
Mt. Rainier National Park	09/24/98	1.377	18.49	19.87	7.44	10.30	0.313	0.850	0.214
Goat Rocks Wilderness	09/25/98	0.230	16.45	16.68	1.40	2.71	0.034	0.080	0.115
Mt Adams Wilderness	09/24/98	0.233	20.78	21.02	1.12	7.37	0.054	0.121	0.058
Mt Hood Wilderness	07/02/98	0.604	24.71	25.31	2.45	4.03	0.341	0.146	0.117
Olympic National Park	10/29/98	2.010	22.17	24.18	9.07	8.86	0.563	0.702	0.745
	10/30/98	1.608	25.29	26.89	6.36	12.21	0.513	0.591	0.503
	02/12/99	0.911	16.66	17.57	5.47	4.80	0.259	0.144	0.509
Alpine Lakes Wilderness	05/08/98	1.350	27.11	28.46	4.98	14.78	0.308	0.784	0.257
Glacier Peak Wilderness	07/03/98	0.941	46.58	47.52	2.02	15.02	0.650	0.209	0.083
North Cascades National Park	05/21/98	0.286	17.10	17.38	1.67	2.63	0.128	0.066	0.092
Pasayten Wilderness	05/21/98	0.136	17.10	17.23	0.79	2.63	0.061	0.032	0.042
Class II Area of Interest									
CRGNSA (All Areas)	07/02/98	0.905	34.67	35.58	2.61	5.02	0.517	0.216	0.172
Mt. Baker Wilderness	01/05/99	0.774	21.52	22.29	3.60	11.36	0.153	0.476	0.145

Note: Emissions are based on continuous operation with supplemental duct firing.
Background extinction derived from aerosol data on days with the best visibility (top 5%).

3.2.3 Potential Cooling Tower Impacts

Phase II additional generation capacity will include a 10-cell cooling tower to provide thermally regulated water for use in power generation. Phase I, currently under construction, will have a cooling tower, which is a 9-cell linear mechanical draft tower.

Each tower will operate independently by phase. Both may operate together if both phases be providing electrical power to the grid concurrently. The towers can also operate separately to support only that phase operating.

The heat and humidity from the cooling tower may be sufficient to produce visible plumes. The potential for localized fogging and rime icing under certain atmospheric conditions may exist should the plume approach ground level.

The Seasonal/Annual Cooling Tower Impacts (SACTI) model was used to assess the potential for the occurrence of fog or rime ice and visible plumes from the proposed cooling tower operation at Satsop. The model was run for each cooling tower location (Phase I and Phase II) operating both independently and then combined to form aggregate impacts.

Results of the SACTI analysis suggest that a total of less than 1 hour of fogging per year could occur and that rime ice formation is unlikely. The potential fogging events are most likely to occur northeast of the facility and could extend downwind toward the Chehalis River. Visible plumes are likely to occur less than 40 hours per year and will typically extend less than 300 meters (m) from the cooling towers. Further, the model suggests that based on current data regarding the proposed cooling tower, deposition values should be minimal.

3.2.2.1 SACTI Modeling Methodology

The Satsop CT Project power generation facility will be equipped with two cooling towers – one in Phase I (1x9 cells) and the other to support Phase II (2x5 cells). The cooling tower specifications pertinent to the SACTI requirements are shown in Table 3.2-5. Along with the input requirements in Table 3.2-5, SACTI uses hourly meteorological data to calculate the potential for fog or rime ice formation. Representative site-specific meteorological data obtained at the project site in 1980 and 1981 were used along with mixing height data from Quillayute. A full 12-month period of data was used (February 1980 – January 1981).

Table 3.2-5
Cooling Towers – SACTI Input Parameters

Input Parameter	Phase I Tower	Phase II Tower
Number of Cells	9	10
Effective Cell Diameter (m)a	29.7	31.33
Tower Length (m)	150.8	82.3
Tower Width (m)	18.6	32.9
Tower Height (m)	15.35	15.54
Heat Dissipation Rate (MW)	532.5	532.5
Input Airflow Rate (kg/s)	1002.9	1002.9
Tower Orientation Axis	East/West	East/West
Representative Wind Directions (degrees from north)	0, 45, 90	0, 45, 90
Surface Roughness (cm)	10	10
Hours Modeled	8735	8735

[a] – The effective cell diameter is calculated as $D_{eff} = (N)^{1/2} D$, where D is the cell diameter (32.5 ft = 9.9 m) and N is the number of cells.

The site-specific data included wind speed and direction and temperature measurements. Hourly relative humidity data from Olympia were used to supplement the site-specific data. The 12-month period of site-specific Satsop data was the same period approved by Ecology and used in the PSD permitting for the Satsop operations. The 12-month period used is representative of general conditions in the area and especially reflects the local wind patterns. How this 12-month period relates to climatic trends is important in understanding the representativeness of the results.

Climate data from the nearby Olympia National Weather Service site reports annual average temperatures of 49.2 °F over a 30 year period (1960-1991) with average wind speeds over a 42 year period reported to be 6.7 mph and a prevailing wind direction from the south-southwest (SSW). These values compare favorably with the Satsop site specific data as the average annual Satsop temperature is 50 °F, the average wind speed is 6.6 mph and the prevailing wind direction is also from the southwest sector.

Given the agreement in wind speed, direction, and temperature between the single 12-month Satsop period and the longer term values from Olympia, the data used are considered typical of the area. Even with this comparison, short-term variability in conditions can affect the prediction of cooling tower plume impacts. Therefore the results of the analysis are considered an indicator of likely occurrence and not an absolute predictor of events.

3.2.2.2 Fogging and Rime Ice Potential

The potential for fogging and rime ice formation were assessed in SACTI for each tower separately and in combination. Potential fogging conditions can occur when atmospheric conditions allow the cooling tower plume to generate a cloud that contacts the ground. This can occur under periods of high humidity and favorable temperatures and stabilities with the fog being "nucleated" or generated by the cooling tower plume. Should fog be generated across a highway or other thoroughfare, it may become a potential hazard and mitigation measures such as signs and traffic assistance may be needed.

The distance dependent potential for fog formation for the Satsop cooling towers is shown in Table 3.2-6. The values shown in the tables are the average annual hours of occurrence over the single year of meteorological data modeled. As shown in Table 3.2-6, a potentially combined fogging occurrence of about 1-hour is the maximum predicted fogging occurrence for the year. The fogging events were predicted to occur in the spring. The farther from the tower, the less likely fogging will occur.

Table 3.2-6
Phase I and Phase II Cooling Towers – Hours of Potential Fogging

Distance (m)	Phase I	Phase II	Total
100	0	1.1	1.1
200	0.5	0.6	1.1
300	0.5	0.5	1.0
400	0.5	0.5	1.0
500	0.5	0.5	1.0
600	0.5	0.1	0.6
700	0.5	0	0.5
800	0.5	0	0.5
900	0.5	0	0.5
1000	0.5	0	0.5
1100	0.5	0	0.5
1200	0.5	0	0.5
1300	0.5	0	0.5
1400	0.5	0	0.5
1500	0.2	0	0.2
1600	0	0	0.0

The directional dependence of the fogging events for each tower is depicted in Figure 3.2-1. The fogging event patterns reflect the wind directions depicted in wind roses for the site and as shown extend to the northeast in the direction of the prevailing wind.

The nearest roadways may be affected by the predicted fogging potential and limited fogging may be found along the railway located near the Chehalis River even though at a lower elevation than the Satsop project site. The effects of terrain elevation are not directly considered in SACTI, however the atmospheric conditions that will promote fogging events are likely to allow any fog formed to remain near ground level even toward the river. Hence, some residences nearby may experience very limited fogging from cooling tower operations.

SACTI predicted no occurrences of rime ice formation for the year-long data record. This prediction should be used as a guide to suggest that rime ice formation is unlikely but given that fog formation is predicted, riming could occur under unusual meteorological circumstances not captured in the year of meteorological data used.

Figure 3.2-1 Annual Hours of Potential Fogging - Phase 1 and Phase II Cooling Towers

The average springtime minimum temperatures reported in the Olympia climate data are 33.6, 36.2, and 41.0 F for the months of March, April, and May respectively. The mean number of days per month with a minimum temperature below 32 F over a 36 year period were 14, 8, and 2 for the same springtime months. Therefore, it is unlikely that rime ice formation will occur through combination of fogging and freezing temperatures, though possible given the occurrences of infrequent freezing conditions.

3.2.2.3 Visible Plume

The SACTI results suggest a maximum annual occurrence for visible plumes to be less than 40 hours. Predicted plume heights for the two towers, operating concurrently, were shown to range from 40 to over 300 m depending on the condition modeled and predicted plume lengths. The model calculated plume length ranged from 0 to 7000 m with radii of between 25 and 300 m. The typical plume length predicted is less than 1000 m with the majority of calculated plume lengths less than 300 m.

The areal extent of the predicted visible plumes for both cooling towers is depicted in Figure 3.2-2. Also shown is the shaded relief of the terrain in the area of Satsop.

As seen in Figure 3.2-2, the potential visible plume extents reflect the predominant wind directions with some cross valley flow capable of producing visible plumes in the vicinity of State Route 12 located across the Chehalis River valley. While the model can calculate such events, this is very unlikely given the distance and the homogeneous and persistent atmospheric conditions necessary to sustain a visible plume of that length.

With the predicted plume heights and proximity to elevated terrain south of the Satsop site, there is the potential for plume/terrain interactions. However, even though SACTI does not include direct calculations of plume/terrain interactions, because the wind profiles were collected at the site, it is likely that the plume/terrain interactions shown reflect the terrain effects already on winds and plume travel directions.

3.2.2.4 Deposition

The SACTI model includes parameters to calculate drift and deposition of salts within the cooling water. The Satsop cooling towers are reported to have a total of 513 ppm total dissolved solids reflecting the salt concentration in the cooling water. The drift rate is calculated based on 0.001% of the circulation rate of 175,000 gallons/minute (gpm). Therefore the drift rate is .00001*175,000 gpm = 1.75 gpm (6.62×10^{-3} m^3/min) or 110.4 grams/sec. All drift was assumed as PM10.

Results of the SACTI modeling for deposition reported very little to the outlying areas and therefore it is not expected that the cooling towers will appreciably affect nearby areas.

Figure 3.2-2 Combined Annual Frequency of Occurrence of Visible Plume - Impacts from Cooling Towers

3.3 Water

For the Phase II project, the Certificate Holder will purchase up to 9.5 cfs of water from the Grays Harbor Public Development Authority PDA). The PDA's water authorization was approved by the Washington State Legislature along with the transfer of the Satsop Development Park property from Energy Northwest. It is a senior water right that is that is not subject to "low flow" or "base flow" restrictions. Because the withdrawal of up to 9.5 cfs of water for Phase II could occur during the period when the flow in the Chehalis River is below the baseflow levels established by regulation, the following analysis is focused on the potential impacts to aquatic resources including temperature.

3.3.1 Baseflows

The Department of Ecology has established by regulation "baseflows" for the Chehalis River which vary to correspond with typical seasonal flow conditions. The baseflows near the project site range from 550 cfs during the late summer and early fall (August 15th to October 1st), to 3,800 cfs during winter and spring when higher stream flows are expected. The effects of the proposed withdrawal during the lowest baseflow period provide the best illustration of the potential environmental impacts because: 1) the proposed withdrawal represents the highest percentage of the total river flow and thus the greatest potential for adverse effects; and 2) this period represents a portion of the critical upstream spawning migration period for adult salmon.

An evaluation of the proposed combined withdrawals on river levels under the minimum regulatory baseflow is provided below. This evaluation includes: an analysis of typical discharge conditions at the project site; an evaluation of the extent of mitigating tidal influences in the area of the mainstem Chehalis River that would be affected by the proposed withdrawals; and the predicted effects of the proposed withdrawals on habitats and species associated with the affected area.

The potential for adverse effects from plant discharge on water quality in the mainstem Chehalis River has also been examined. This evaluation found that the discharge would meet NPDES requirements even under highly improbable extreme low flow conditions (104 cfs, or 25 percent of the recorded 10-day 7-year low flow).

3.3.2 Discharge Analysis

River discharges at the proposed project location were calculated using two methods. Established baseflows on the Chehalis River at the Satsop gauging station located approximately three miles upstream of the proposed plant intake are shown in Table 3.3-1. These baseflows are established on two-week intervals according to Ecology (1976). The highest established baseflows are between December 1 and April 30 (3,800 cfs), and the lowest established baseflows are between August 15 and September 30 (550 cfs).

Table 3.3-1
Established Baseflows
Chehalis River at Satsop, Washington
USGS gauging station No.12.0350.02

Month	Day	Discharge, cfs	Month	Day	Discharge, cfs
Jan	1	3,800	Jul	1	1,085
	15	3,800		15	860
Feb	1	3,800	Aug	1	680
	15	3,800		15	550
Mar	1	3,800	Sep	1	550
	15	3,800		15	550
Apr	1	3,800	Oct	1	640
	15	3,800		15	750
May	1	2,910	Nov	1	1,305
	15	2,300		15	2,200
Jun	1	1,750	Dec	1	3,800
	15	1,360		15	3,800

Source: Ecology, 1976, WAC 173-522-020
cfs = cubic feet per second

While long-term river discharge information was not readily available for the Satsop gauging station, over 100 years of flow records are available from USGS stream gauging stations at Grand Mound and Porter on the Chehalis River and on the Satsop River. Earlier work by Dames & Moore (1994) established that surface water discharge values from the Satsop River and the Chehalis River at Grand Mound, Washington gauging stations, when summed and multiplied by a factor of 1.5 (the method used by USGS to account for the Black River tributary and other inflows) are equivalent to discharges at the Satsop gauging station. A comparison of available river discharge data at Satsop between October, 1979 and September 1983 with the combined discharge values for the same period of time found a close correlation between the two values.

Using this combined gage methodology, river discharges were graphed for the 22-year period between October, 1979 and December 2001. The discharge data were compared to the regulatory baseflows for the equivalent days. Over the 22-year period of review, estimated stream flows in the Chehalis River at Satsop did not meet minimum required flows for 919 days, or 11.3 percent. During the same period, 15 days (0.2 percent) did not meet the minimum required baseflow of 550 cfs. This 22-year period roughly encompasses a phase of decadal scale climate variability characterized by relatively warm, dry winters and low river flows in the Pacific Northwest (Mantua et al. 1997). Therefore the discharges recorded during this period are believed to be representative of low flow conditions below the long-term average.

3.3.3 Tidal Influence

One variable not accounted for by the average daily discharge reported in the gage data is tidal influence from the Grays Harbor estuary. Significant tidal flux occurs in the lower Chehalis River drainage. Mixed semi-diurnal tidal fluctuations in the Chehalis River at Montesano (3 miles downstream of the water supply) average 8.2 feet and commonly exceed 10 feet (Ebasco 1978, Envirosphere 1978, Nautical Software, Inc. 1997). For example, the maximum tidal amplitude (i.e., the change in water level) at Montesano was 10.3 feet over a 6.5 hour period on March 31, 2002 (Nautical Software, Inc. 1997). At the proposed diversion point, the tidal flux is reported to be approximately 4 feet. For comparison of storage values to river height, an increase in one foot of stage height at the Porter gage on the Chehalis River, ten miles upstream of the proposed intake, is equivalent to an approximate 1,000 cfs increase in discharge. This tidal flux acts to store river water by raising the river level, effectively creating backflow past the proposed diversion point. This backflow reverses the flow that has already flowed past the proposed diversion point. Actual available water, based on tidal flux, is significantly greater than the recorded discharge value.

3.3.4 Predicted Effects on Aquatic Habitats and Species

Withdrawal of surface water (reductions in water quantity) can adversely affect aquatic habitats and species by reducing the wetted habitat area available for spawning, rearing, forage, and fish passage, and by changes in water quality conditions which adversely affect aquatic habitats and species. Specifically, water withdrawals that severely lower baseflows during summer base flow periods can result in greater surface-to-volume ratio, increased solar exposure per unit volume, and consequent unfavorable increases in stream temperature. This issue is of particular concern in the middle reaches of the mainstem Chehalis River, which suffers chronically from summer water temperatures in excess of levels supportive of salmon and trout. Stream temperatures in the vicinity of the project area tend to recover to ranges supportive of native fish species due to the inflow of the Black and Satsop Rivers.

An analysis of the effect of the combined Phase I and Phase II operational water withdrawals on river level is useful for predicting potential adverse effects on aquatic habitats and species. The estimated maximum instantaneous water requirement for combined Phase I and Phase II operation is 19 cfs. This maximum includes process water and water to cool the temperature of the discharge to a temperature below that specified in the existing NPDES permit. Conservatively assuming that all the process water withdrawal comes from the river during the lowest regulatory baseflow of 550 cfs and, the worst case combined Phase I and Phase II, withdrawals are only 3.0 percent of this flow. Under actual operating conditions the net water withdrawal from the river would be less than 19 cfs due to two modifying factors: 12 percent of the water supply is derived from groundwater (although this groundwater would at least partially support summer baseflows); and, approximately 3 cfs in return flows would be discharged to the river upstream of the withdrawal site.

The combined effects of combined Phase I and Phase II operation on river level are examined using the following conservative assumptions: 1) constant withdrawal of the full combined operational allocation; 2) the supply is entirely derived from Chehalis River surface waters; and 3) approximately 3 cfs in operational discharge flows will be returned to the river upstream of the withdrawal site. Based on these assumptions, the maximum net constant withdrawal for combined Phase I and Phase II operation is approximately 16 cfs. Provisional data from the USGS gage closest to the well field site (12.03050.02, Chehalis River near Satsop) indicate that a flow reduction of 16 cfs equates to a change in river height of 0.02 feet, or 0.24 inches. A change of this magnitude, even when the river is below regulatory baseflow levels, is essentially undetectable using conventional river level measurement techniques (Wiggins 2001).

Determining what effect this minor change in river height could have on habitat area is complicated by the significant tidal influence on river level throughout the lower Chehalis River. The mainstem Chehalis River at the withdrawal site is backwatered during high tides, with extreme changes in water levels occurring over short time periods. For example, tidal fluctuations as great as 10 feet in amplitude occur over a 6-hour period occur at Montesano, 3 miles downstream from the well field. The reported extent of tidal fluctuations in the vicinity of the project area is approximately 4 feet. Tidal fluctuations of such magnitude completely overwhelm any effect of the combined withdrawals on river level, water temperatures, and aquatic habitat area.

While water withdrawals will have no discernable effect on river levels and habitat area, a significant reduction in surface water flow in the lower Chehalis mainstem could theoretically result in greater upstream intrusion of estuarine water into the Chehalis River mainstem on average over all flow conditions. Hypothetically, this could result in a gradual shift towards estuarine habitat conditions for a short distance upstream above the current limit of salt water intrusion, with a concomitant shift in plant and animal communities. The magnitude of this effect is difficult to estimate due to unpredictable variability in river flows on daily, weekly, and monthly time scales in conjunction with tidal fluctuations. Changes in the extent and location of estuarine habitats could have either beneficial or adverse effects on various species, depending on the nature and extent of the effect. Overall, any changes in aquatic habitat composition resulting from the combined Phase I and Phase II water withdrawals will be minimal in comparison to the historic effects of total water withdrawals in the basin and the influence of decadal scale climate variability on precipitation and river flows.

Adverse effects on fisheries resources and aquatic habitats from changes in water quantity and shifts in habitat composition are evaluated based on measurable effects on the area available for migration, spawning, and rearing, and the secondary effects of flow reduction on water quality, particularly temperature. As noted above, the proposed total water withdrawals for Phase I and Phase II will not have a significant impact on river height, and therefore aquatic habitat area, under the lowest baseflow conditions. Further, the marginal level of effect on river levels will be overwhelmed by existing tidal influences. Therefore, it is reasonable to conclude that there will be no measurable impact on aquatic habitat area and river flow. Similarly, the proposed withdrawal will have no discernable impact on water temperatures due to the overwhelming tidal influence on water level and stream flows (Pinney 2001). Given these findings, the following conclusions have been reached regarding the predicted effects of combined Phase I and Phase II operational withdrawals:

- There will be no significant impacts on aquatic habitats, including wetland and nearshore habitats on the state Priority Habitats and Species (PHS) list.
- There will be no adverse impacts on state or federal endangered, threatened, proposed or candidate species.
- There will be no adverse impacts on other aquatic habitats or species.

3.4 Plants

There is currently no vegetation on the site. The Phase II construction will not require any additional clearing or vegetation removal adjacent to the site or in the utility corridors.

3.5 Animals

Wildlife and habitat were evaluated extensively at the time the Phase I project was originally permitted. Habitat surveys were conducted during winter (January 1994) and spring (May and June 1994) to document existing habitat conditions at the plant site and in surrounding areas (WPPSS 1994). Surveys completed in 1994 were for the Phase I project (which included the study area for the Phase II project), as well as the pipeline corridor and the transmission line corridor (which were part of Phase I only). To supplement information obtained from the 1994 surveys, current WDFW PHS maps were consulted to identify species and habitat areas of concern occurring in the study area vicinity. In addition, a bald eagle survey was conducted in February 2001 to determine the presence or absence of bald eagle nesting habitat within 0.5 mile of the Phase II study area. Prior to the survey, WDFW biologists were contacted for information about next sites and bald eagle activity near the study area not otherwise indicated on the PHS maps.

3.5.1 Special Status Species

Special status species refer to those species that are currently listed or under consideration for listing under the federal ESA, and/or are protected or are under consideration for protection at the state level. Two species occurring or potentially occurring in the vicinity of the Phase II study area, bald eagle and northern spotted owl, are currently listed as threatened under the ESA. Two other species, streak horned lark and the western pocket gopher, are currently candidate species for listing under the ESA. There are several additional species federally listed as species of concern, as well as species listed at the state level. Special status species occurring or potentially occurring near the vicinity of the study area are listed in Table 3.5-1. Specific information on federally listed species is provided below.

Table 3.5-1
State and Federal Species of Concern Occurring or Potentially Occurring in the Vicinity of the Study Area

Common Name	Scientific Name	Federal Status (a)	State Status (b)
Yuma myotis	*Myotis yumanensis*	SOC	-
Long-eared myotis	*Myotis evotis*	SOC	-
Long-legged myotis	*Myotis volans*	SOC	-
Keen's myotis bat	*Myotis keenii*	-	C
Townsend's big-eared bat	*Coryhorhinus townsendii*	SOC	C
Mazama (western) pocket gopher	*Thomomys mazama*	C	C
Western gray squirrel	*Sciurus griseus griseus*	SOC	T
Oregon vesper sparrow	*Pooectetes gramineus affinis*	SOC	-
Pacific fisher	*Martes pennanti pacifica*	SOC	E
Bald eagle	*Haliaeetus leucocephalus*	T	T
Northern goshawk	*Accipiter gentiles*	SOC	C
Spotted owl	*Strix occidentalis*	T	E
Vaux's swift	*Chaetura vauxi*	-	C
Pileated woodpecker	*Dryocopus pileatus*	-	C
Olive-sided flycatcher	*Contopus cooperi*	SOC	-
Willow flycatcher	*Empidonax traillii*	SOC	-
Streaked horned lark	*Eremophila alpestris strigata*	C	C
Purple martin	*Progne subis*	-	C
Western toad	*Bufo boreas*	SOC	C
Tailed frog	*Ascaphus truei*	SOC	-

(a) Current species information derived from the Priority Habitats and Species and Natural Heritage Data Systems (WDFW 2001, WDNR 2001), and USFWS 2001.
SOC = Federal Species of Concern
FT = Federal Threatened Species
PT = Federal Proposed Threatened Species
C = Federal Candidate Species
N/W = Not warranted
(b) E = State Endangered - A species, native to the state of Washington, that is likely seriously threatened with extirpation throughout all or a significant portion of its range.
T = State Threatened - A species, native to the state of Washington, that is likely to become endangered in the foreseeable future throughout a significant portion of its range within the state without cooperative management or the removal of threats.
C = State Candidate - A species that is under review for possible listing as endangered, threatened, or sensitive.
S = State Sensitive - A species native to the state of Washington that is vulnerable or declining and likely to become endangered or threatened throughout a significant portion of its range within the state without cooperative management or removal of threats.

3.5.1.1 *Bald Eagle*

The bald eagle is currently listed as threatened under the ESA by USFWS. Eagles are present in the general vicinity of the project area, and regularly forage in habitats associated with the main stem of the Chehalis River to the north. The closest mapped bald eagle nests are approximately 1.5 miles northeast of the Phase II study area. The location and status of these nests were confirmed by personal communication with the WDFW area biologist (Zahn 2001). Also confirmed was that there are no known bald eagle nests within the study area boundary, or in the immediate vicinity (Zahn 2001). The field survey found no bald eagles or bald eagle nests within 0.5 mile of the study area.

3.5.1.2 *Northern Spotted Owl*

The northern spotted owl is currently listed as threatened under the ESA by USFWS. Spotted owls are known to be old-growth obligates, meaning they have specific habitat requirements that generally limit their range to old-growth forest regimes. As mentioned previously, the Phase II site was cleared and graded in preparation for previously planned development, and the surrounding area has a history of extensive timber harvest. As a consequence, there is no old-growth forest habitat within the study area. However, WDFW PHS maps do identify a spotted owl circle in the general project vicinity in association with woodland habitat. (Spotted owl circles are protected habitat zones defined as part of the ESA recovery plan of 1.8-mile radius around identified nesting areas.) The outer boundary of this circle is several miles from the Phase II study area.

3.5.2 Environmental Impacts of the Proposed Action

Construction of Phase II will not result in any loss or degradation of existing habitats in the study area. As discussed previously, the site was cleared and developed for construction of the WPPSS WNP-3 facility, and has essentially no habitat value for wildlife. Existing roads and access points will be used during construction, and no new roads or right-of-ways will be developed as part of Phase II development. Indirect impacts from human activity and noise generated from construction of the plant could result in temporary disturbance of wildlife in immediately surrounding habitat areas. However, the site is currently undergoing significant construction and activity in connection with the previously permitted Phase I project. The construction of Phase II is not expected to result in any additional impacts. Moreover, wildlife tends to habituate, and have likely already habituated to Phase I activity.

Noise in the area immediately to the east of the Satsop CT Project site will increase from 61 dB(A) with Phase I operating, to 75 dB(A) with both plants in operation. This is a considerable increase in noise; however, given the fact that wildlife tends to habituate, the increase in noise from the addition of Phase II is not likely to permanently impact wildlife in the surrounding areas.

WDFW management recommendations for noise impacts on wildlife (based on a WDF report by Milner and Roderick 1991) include a site-specific approach to designating buffers for bald eagle nests. In general, buffers for active nests range from 1,300 to 2,600 feet (0.25 to 0.5 mile) during the nesting period (January through August 15). Because no bald eagle nests were identified within 0.5 mile, no additional buffer areas are seen to be necessary.

No special wildlife use areas, such as fawning areas, seasonal congregation areas, or critical seasonal use habitats adjacent to the study area are documented in available data and information, and none were noted during field surveys. Construction and maintenance vehicle traffic may cause mortality among some individual animals as they cross the access roads.

These impacts generally will affect a very small percentage of the existing animal populations, and therefore the impacts will not be significant.

Because the plant site was previously developed and no new utility corridors are required for Phase II, there will be no impacts to vegetation or wildlife from the construction or operation of Phase II. Therefore no mitigation measures are necessary for wildlife species and habitats in the vicinity of the site.

3.6 Energy

The project is an energy facility converting natural gas to electricity. The project as designed will incorporate the most efficient process commercially available for generating electricity from natural gas. The facility is expected to operate more efficiently than many other types of thermal plants. During construction moderate amounts of energy would be used to operate the construction equipment. Natural resources to be used would be steel (from iron ore) and concrete (from aggregate and sand from quarries and pits).

3.7 Environmental Health

The Certificate Holder has a Spill Prevention Control and Countermeasures (SPCC) Plan for Phase I of the Satsop CT Project that has been approved by EFSEC. The Plan will also be applicable to Phase II.

The risk of a fire or explosion during construction of the Phase II facility is considered to be extremely low. During construction, small quantities of flammable liquids and compressed gases will be stored and used. Following state and federal construction safety requirements will mitigate the potential hazards associated with use of these materials. Operation of the Phase II facility will require the use of two materials that can be explosive under certain conditions: natural gas and hydrogen gas. The risk of an explosion in the Phase II facility will be mitigated by designing, constructing, and operating the facility as required in the latest versions of the applicable codes, regulations, and consensus standards.

Similar safety measures have been in place during Phase I construction. The construction has been underway since September 2001 without any injuries, fires or explosions.

3.8 Noise

Regulations applicable to the proposed Phase II expansion are found in WAC Chapter 173-60, Maximum Environmental Noise Levels. There are no community noise regulations in effect for Grays Harbor County.

The State of Washington has established noise regulations based on land use compatibility as shown in Table 3.8-1. The regulations prohibit a source from generating more than the specified amount of sound at the receiving location. They do not require the cumulative sound generated by all sources to remain below the specified levels. For the purpose of this analysis, we have analyzed the impacts of Phase II, and then the cumulative impacts of Phases I and II as a single source.

Table 3.8-1
Maximum Permissible Environmental Sound Levels

EDNA of Noise Source	Maximum Permitted Sound Level by EDNA of Receiving Source		
	Class A[a]	Class B[a]	Class C[a]
Class A	55	57	60
Class B	57	60	65
Class C	60	65	70

[a]Sound levels in dB(A).

Notes:
EDNA = Environmental Designation for Noise Abatement
Class A = Residential areas or lands where human beings reside and sleep; such as residential areas, multiple family living areas, recreational and entertainment areas (e.g., camps, parks, resorts), community service areas (e.g., retirement homes, hospitals, health and correctional facilities).
Class B = Commercial areas or land uses requiring protection against noise interference with speech; such as commercial living and dining areas, motor vehicle services, retail services, banks, office buildings, and commercial and recreational areas not used for human habitation (e.g., theaters, stadiums, fairgrounds, amusement parks, and educational, religious, governmental, and cultural facilities).
Class C = Industrial areas or lands involving economic activities; such as agricultural, storage, warehouse, production, and distribution facilities.
Source: Washington State Department of Ecology, Noise Regulations, Chapter 173-60

Although not specifically stated in the code, the noise abatement criteria are assumed to be presented as equivalent sound levels (L_{eq}). For noise-sensitive areas or areas which fall under Class A (residential areas), the noise abatement criterion is an L_{eq} of 60 dB(A) when the noise originates from a Class C site. For areas which fall under Class B (commercial areas), the noise abatement criterion is an L_{eq} of 65 dB(A), when the noise originates from a Class C (industrial) site. And, for areas which fall under Class C, the noise abatement criterion is an L_{eq} of 70 dB(A) when the noise originates from a Class C site. Between the hours of 10:00 P.M. and 7:00 A.M. the noise limitations in Table 3.8-1 are reduced by 10 dB(A) for receiving property within Class A areas. Additionally, at any hour of the day or night, the applicable noise limitations may not be exceeded in any 1-hour period by more than 5 dB(A) for a total of 15 minutes, 10 dB(A) for a total of 5 minutes, or 15 dB(A) for a total of 1.5 minutes. These correspond to the L25 (25 percent of 1 hour, or 15 minutes), L8.3, and L2.5 sound levels, respectively. Assuming the worst-case conditions of the proposed Phase II plant running 24 hours per day, these time-weighted adjustments would not apply for this project. Rather, the steady-state WAC 173-60 L_{eq} limits are pertinent without adjustment.

The Phase II expansion site is located within Grays Harbor County's Industrial (I-2) zoning designation. Based on this information, the plant site and the surrounding areas are categorized as Class C. Current existing residences are located in General Development District Five (GD-5), which, for purposes of this analysis, is assumed to be Class A. These applicable noise level limits, as well as the pertinent existing conditions, are summarized in Table 3.8-2.

Table 3.8-2
Pertinent Allowable Sound Levels for Proposed Phase II Plant

Location(a)	2001 Nighttime Ambient Noise Level, L_{eq} dB(A)	WAC 173-60 Nighttime Noise Level Limit, L_{eq} dB(A)
Plant_W (#1)	42.8	70
Plant_S (#2)	35.8	70
Plant_N (#3)	34.7	70
Plant_E	No data	70
#4	42.4	50
#5	32.4	50
#6	41.2	50
#7	35.0	50

(a) Locations are shown in Figure 3-12.

3.8.1 Noise Evaluation and Analysis

3.8.1.1 Methods

A computerized noise prediction program was used to simulate and model the noise propagation from the Phase II plant. The modeling program uses industry-accepted propagation algorithms based on standards written by CONCAWE[1]. The calculations account for classical sound wave divergence (spherical spreading loss with adjustments for source directivity from point sources) plus attenuation factors due to air absorption, minimal ground effects, and barrier/shielding (including reductions from vegetation/forestation)[2].

Calculations are performed using octave band sound power levels (abbreviated PWL or Lw) as inputs from each noise source. The computer outputs are in terms of octave band and overall A-weighted noise levels (sound pressure levels, abbreviated SPL or L_p) at discrete receptor positions or at grid map nodes (in preparation for computing a contour map). The output listing is ranked by relative noise contribution from each noise source. This model has been validated over the years via noise measurements at several operating plants that had been previously modeled during the engineering design phases.

The receptor locations were chosen to match, as closely as possible, the positions used in the 1995 application, and the 2001 ambient survey. Both the source locations and receptor locations were translated into input x, y, z coordinates for the noise modeling program.

3.8.1.2 Procedures, Inputs, and Assumptions

For conservatism, and as is standard practice in the description of environmental noise, the modeling assumed stable atmospheric conditions suitable for reproducible measurements (under “standard day” conditions of 59°F and 70 percent relative humidity), that are favorable for propagation. These inherently conservative factors and assumptions result in a noise model that will tend be biased to higher predicted values than would be expected in the actual environment around the proposed project.

[1] CONCAWE is the oil companies’ European organization for environment, health, and safety, headquartered in Brussels, Belgium. The noise propagation standard was originally published in 1981 under the title “The propagation of noise from petroleum and petrochemical complexes to neighboring communities.” Parts of this method are also included in the ISO 9613, ISO 1913 (Part 1), ANSI 126, or ISO 3891 standards.
[2] For ease of use and computational efficiency, the model does not provide for advanced ground attenuation definitions, special screening effects, or complex meteorological variables.

All continuous-operation equipment items that were deemed to be significant noise sources at the Phase II plant were included in the noise model. The set of modeled sources included turbines (gas and steam), heat recovery steam generators (HRSGs) pumps, motors (taken to be totally enclosed, fan-cooled or weather-proof, Type II, depending on horsepower rating[3]), main transformers, air compressors, fans and blowers (including roof-top ventilators and HVAC units), cooling tower cells, and chiller modules. Only the currently planned Phase II set of power generation equipment was modeled.

The plant was assumed to operate 24 hours per day, which means its noise output would be constant regardless of time of day. Given the early stages of the project, project-specific vendor data is not available. The modeling inputs used noise emission values that were obtained from equipment vendors on several recent Duke/Fluor-Daniel (D/FD) design efforts for similarly-sized plant configurations, and data used for the Phase I design.

No special noise control options were initially assumed. These "standard design" levels from the significant noise sources were converted into sound power levels (in decibels re 1 pico Watt) to serve as inputs for the noise modeling program. Major buildings were included as barriers, as were the HRSG's bodies and some large storage tanks. However, for conservatism, only the end caps of the cooling tower were considered as barriers. The analysis included the benefits of Phase I barriers and structures that will be in place prior to the start-up of Phase II. Specifically, the Keys Road sound wall along the entire length of the west site boundary, as well as several Phase I retaining walls, equipment, and buildings were included in the Phase II model.

Sound emissions values were modeled to calculate the expected noise levels at the selected receptor locations. For several receptors, initial noise estimates produced noise levels that were above regulatory requirements. To achieve compliance, noise contributing equipment was evaluated. An iterative process of reducing the highest noise contributors, via the effective application of noise control treatments such as installing silencers on exhausts or using low-noise equipment, was performed. This process achieved an efficient, cost-effective, and reasonably achievable mix of noise source characteristics.

3.8.2 Construction Impacts

Areas adjacent to the proposed project will be exposed to construction sounds produced by construction equipment and activities. Construction activities are excluded from Ecology noise regulations. However, the following construction sound abatement measures, which are included in the existing Phase I SCA, will be included in the project construction specifications to mitigate construction sound impacts:

- Construction will not be performed within 1,000 feet of an occupied dwelling unit on Sundays, legal holidays, or between the hours of 10:00 P.M. and 6:00 A.M. on other days.

- All construction equipment will have sound control devices no less effective than those provided on the original equipment. Equipment will not be operated with unmuffled exhaust systems.

- Pile driving, if required, would not be performed within 3,000 feet of an occupied dwelling unit on Sundays, legal holidays, or between the hours of 8:00 P.M. and 8:00 A.M. on other days.

[3] Small equipment items, such as pumps less than 20 horsepower, were excluded since they were considered as insignificant sources.

Despite inclusion of the measures described above, areas adjacent to the project will be exposed to increased sound levels during active periods of construction. This will be a short-term impact. The Certificate Holder will notify nearby residents in advance of the anticipated schedule for construction activities.

3.8.3 Operation Impacts

The site boundary and nearby community noise levels that are predicted from the Phase II plant operations (only) are summarized in Table 3.8-3 along with the pertinent noise level limit and information (for reference) on the ambient noise environment at each receptor location.

Table 3.8-3
Summary of Modeling Results for Proposed Phase II Plant

Location	2001 Nighttime Ambient Noise Level, L_{eq} dB(A)	Maximum Allowable Contribution from Proposed Phase II Plant, dB(A)	Predicted Contribution from Proposed Phase II Plant, dB(A)	Total Predicted Future Noise Environment (Measured Ambient plus Proposed Phase II Plant Contribution), dB(A)	Difference between Total Future Noise Environment and Allowable Noise Level Contribution, dB
Plant_W (#1)	42.8	70	42	45	-28
Plant_S (#2)	35.8	70	68	68	-2
Plant_N (#3)	34.7	70	44	44	-26
Plant_E	No data	70	75	75	+5
#4	42.4	50	36	43	-7
#5	32.4	50	37	38	-12
#6	41.2	50	35	42	-8
#7	35.0	50	38	40	-10

Table 3.8-3 shows that the critical analysis locations are the adjacent properties to the south and east. This is because these locations are quite close to the gas turbine generator/HRSG, the steam turbine generator, the chiller modules, and the cooling tower array. Further, these locations receive little benefit from barrier shielding from either Phase II equipment or from Phase I equipment, buildings, and/or walls (as do the receptor locations to the north and west). Therefore, the south and east property line locations served as the primary design points for controlling noise emissions from the Phase II project.

The set of Phase II noise sources was then used to create a noise contour map of the proposed facility. Figure 3.8-1 presents constant, A-weighted sound level contours in 5-dB increments on the currently planned project site from just the Phase II equipment (including the measured ambient environment). Note that this Phase II-only contour would be applicable only in the situation where Phase II was operating and Phase I was idle.

As with Phase I, the Certificate Holder is negotiating an agreement under which the neighboring property owner (Grays Harbor Public Development Authority) has consented to noise levels in excess of the otherwise applicable 70-dB(A) noise limit.

Figure 3.8-1 Predicted Phase II (only) Noise Level Contours (with Ambient) at Project Site

3.8.4 Cumulative Impacts

Since the expectation is to generate power with both Phase I and Phase II in operation, an assessment of the combined noise emissions from the entire site was undertaken. The separate modeling files for the Phase I project and the Phase II project were combined such that the total allotment of site equipment with the common physical barriers could be analyzed. The results are as shown in Table 3.8-4.

Table 3.8-4
Summary of Modeling Results for the Cumulative Phase I and Phase II Plants

Location	2001 Nighttime Ambient Noise Level, L_{eq} dB(A)	Maximum Allowable Contribution from Combined Project Site, dB(A)	Predicted Contribution from just Ph. I Project (for reference only), dB(A)	Predicted Cumulative Contribution from Combined Projects (Ph. I + Ph. II), dB(A)	Total Predicted Future Noise Environment (Measured Ambient plus Proposed Combined Projects, (Ph. I + Ph. II), dB(A)	Difference between Predicted Site Cumulative and Allowable Contribution, dB
Plant_W (#1)	42.8	70	51	52	52	-18
Plant_S (#2)	35.8	70	66	70	70	-0
Plant_N (#3)	34.7	70	53	53	53	-17
Plant_E	No data	70	61	75	75	+5
#4	42.4	50	37	40	44	-6
#5	32.4	50	38	41	42	-8
#6	41.2	50	34	37	43	-7
#7	35.0	50	36	40	41	-9

Since the facility will operate at a constant level day and night, the most stringent noise level limits for the combined facility are the WAC 173-60 nighttime limits as shown in Table 3.8-4. A noise contour map of this cumulative set of compliant site noise sources was created for the proposed facility. Figure 3.8-2 shows the constant, A-weighted sound level contours in 5-dB increments on the currently planned project site from the combined Satsop CT Project, Phase I plus Phase II (including the contributions from the measured ambient noise levels).

Figure 3.8-1 (Phase II only) shows that the project's contribution on the west side of the plant can be expected to be in the mid-40s dB(A), owing primarily to the benefit from the 25-foot-high sound wall along the west side and the cooling tower retaining walls along the north and west sides of the project site. The north and south sides of the plant are expected to be in the high 60s dB(A) due to the proximity of major equipment, coupled with the lack of significant barrier shielding. The proximity of major equipment to the eastern boundary will result in noise levels, generally around 75 dB(A), with a small area around the circulating water pumps that may be expected to be approximately 80 dB(A). More importantly, the 70-dB(A) contour would protrude only marginally off site. The distant residential receptors are predicted to receive contributions from Phase II in the mid- to upper-30s dB(A), which is comparable to the contributions from just the Phase I project at these locations.

Figure 3.8-2 Predicted Phase I Plus Phase II Noise Level Contours (with Ambient) at Project Site

Figure 3.8-2 (cumulative of Phase I plus Phase II) shows combined site contributions in the mid-50 dB(A) range along the west property line and 70 dB(A) or just above along portions of the north and south property lines. The east boundary will generally have noise levels around 75 dB(A) with only a relatively small area in the adjacent wooded parcel exceeding 70 dB(A). The distant residential receptors are predicted to receive total site contributions in the upper-30s to low-40s dB(A).

3.8.5 Mitigation Measures

There are two types of mitigation measures that reduce the noise impacts from the proposed project:

- Equipment Specifications, as shown in Table 3.8-5.
- Noise barriers and walls installed as part of the Phase I construction, as shown in Table 3.8-6.

A Noise Easement on the east side of the property has been granted by the PDA.

Table 3.8-5
Summary of Noise Levels and Potential Control Measures

Noise Source	Noise Level Specification And Proposed Noise Control Measure
Gas turbine (including turbine casing, generator, accessory bay, load compartment, and support skids)	Near-Field Limit: 85 dB(A) at 3’
	Far-Field Limit: 60 dB(A) at 400’ composed of the components: Casing: 55 dB(A) at 400’ Generator: 55 dB(A) at 400’ Accessory Bay: 54 dB(A) at 400’ Exhaust Plenum: 49 dB(A) at 400’ Inlet Plenum: 47 dB(A) at 400’ Load Compartment: 45 dB(A) at 400’ Air Inlet: 44 dB(A) at 400’
	Noise Control: An acoustical enclosure on the turbine, noise treatment of the generator, and a local wall system around the outlet plenum.
Steam turbine/Condenser (including turbine casing, generator, and support skids)	Near-Field Limit: 85 dB(A) at 3’
	Far-Field Limit: 60 dB(A) at 400’ composed of the components: Casing: 56 dB(A) at 400’ Generator: 55 dB(A) at 400’ Condenser: 53 dB(A) at 400’
	Noise Control: An acoustical enclosure on the turbine and noise treatment of the generator as well as acoustical insulation on the condenser and related piping.
HRSG	Near-Field Limit: 85 dB(A) at 3’
	Far-Field Limit: 58 dB(A) at 400’ composed of the components: Transition: 57 dB(A) at 400’ Boiler Section: 50 dB(A) at 400’ Stack Wall: 38 dB(A) at 400’ Stack Exit: 44 dB(A) at 400’
	Noise Control: A stack silencer as well as quiet drum and vent systems.
Cooling tower	Near-Field Limit: 85 dB(A) at 3’ (grade level & on the fan deck).
	Far-Field Limit: 62 dB(A) at 400’
	Noise Control: Specification of a special design, including attention to fan tip speed, blade design, drive mechanisms, and splash control.
Air inlet chiller modules	Near-Field Limit: 85 dB(A) at 3’ (grade level).
	Far-Field Limit: 55 dB(A) at 400’
	Noise Control: Use of a special design, including attention to fan tip speed, blade design, drive mechanisms, and splash control.

Table 3.8-5 (Continued)
Summary of Noise Levels and Potential Control Measures

Noise Source	Noise Level Specification And Proposed Noise Control Measure
Main transformers	Near-Field Limit: 85 dB(A) at 3’
	Far-Field Limit: 55 dB(A) at 400’
Aux. transformers	Near-Field Limit: 72 dB(A) at 3’
	Far-Field Limit: 39 dB(A) at 400’
Air compressors	Instrument air compressors should be limited to 80 dB(A) at 3’
Pumps	Specification of pump and driver trains such that they will be nominally limited to 85 dB(A) at 3’; per the following: Boiler Feedwater: 90 dB(A) for the combined train Cooling Tower Circ’n: 88 dB(A) for the combined train Vacuum Condensate: 90 dB(A) for the combined train Closed Loop Cooling Water: 88 dB(A) for the combined train All other pumps (>25 hp): 85 dB(A) for the combined train All other pumps (<25 hp): 80 dB(A) for the combined train
Control valves	Noise Control: Specification of low-noise valves and/or use of acoustical insulation on valve case and related piping, as appropriate.
Atmospheric vents	Noise Control: Use of low-noise valves (see above) as well as vent discharge silencers, as appropriate, to attain project noise limits and OSHA noise exposure compliance for plant personnel.
Piping	Noise Control: Insulation materials and application methods for both acoustical and thermal qualities.
Other general equipment items (including material handling equipment)	Noise Control: All equipment, stationary and mobile, deemed to be significant noise sources would have noise limits included in the supplier bid conditioning and procurement process. All necessary noise control treatments will be made part of each supplier’s scope.

Table 3.8-6
Summary of Additional Noise Control Measures
Installed as Part of Phase I

Item	Description	Function
West sound wall	The sound wall system is a height of 25’ above plant grade.	Shields the majority of plant equipment for both Phases I and II from the sensitive residential receptors to the west.
North cooling tower wall (north of Phase I cooling tower)	The retaining wall is +20’ above plant grade.	Shields cooling tower noise for both Phases I and II.
West cooling tower wall (west of Phase I cooling tower)	The retaining wall is +20’ above plant grade.	Shields cooling tower noise for both Phases I and II.

3.9 Land and Shoreline Use

The Phase II project complies with Grays Harbor County’s current land use plan and zoning ordinance (Ordinance 241) and was confirmed by the Grays Harbor County Planning Department, and agreed to by EFSEC at its meeting of March 11, 2002. The site is zoned for industrial use and is designated Industrial 2 (I-2). The use of the site for industrial use would be consistent with Grays Harbor Public Development Authority’s planned use of the surrounding Satsop Development Park. The site is not within the shoreline management master program jurisdiction.

3.10 Housing

No housing units are planned to be developed by the project either on the Phase II site or elsewhere. No housing units would be eliminated by the development of Phase II. Permanent employment at the Phase II facility will be approximately 20-25 people. Because of the available housing stock and that some individuals employed by the project likely already reside in the local area, no impact to housing is anticipated.

3.11 Light and Glare

The proposed Phase II project is an expansion of the existing Phase I plant, which is located on a single site in a rural forest clearing. The Phase I plant will be illuminated at night for facility operations under normal conditions and for means of egress under emergency conditions. Illumination levels were designed in accordance with the Illuminating Engineering Society (IES) standards recommended by the following guidance:

- ANSI/IES RP-7, 1983, Industrial Lighting
- ANSI/EIS RP-8, 1983, Roadway Lighting
- Federal Aviation Administration (FAA)
- Occupational Safety and Health Act (OSHA)

In addition, existing high-mast lights in the adjacent industrial yards provide wide-area illumination. Other lights in the immediate area include entry and yard lights around a small grouping of residences located within about two-thirds of a mile of the project site. Evergreen trees surround the project site on two sides, as well as a 25-foot-high wall with vegetated berm along Keys Road and a noise wall partially obscuring the views into the site along the north property line, screen lights originating from the Phase I plant, the Satsop Development Park and other adjacent land uses.

The proposed Phase II project would not significantly increase the existing light and glare conditions. The Phase II project would be illuminated at the same times and illumination levels as the existing Phase I plant. Table 3.11-1 summarizes the illumination levels expected at the proposed Phase II project.

Table 3.11-1
Expected Illumination Levels for Exterior CT Facility Areas

Exterior Location	Maintained Foot-Candles
Boiler platforms	10
Emergency lighting	3
Hydrogen manifold area	20
Electrical switchyard	5
Exterior walkways and platforms	2
Roadway	1
Security fence	0.5
Outdoor areas containing equipment that requires periodic inspection	5
Cooling tower	5

Source: DeRidder 1995

Lighting would be provided for the purposes of general operator access and safety under regular operating conditions. Precise and detailed placement of lighting fixtures has not yet been determined, but light poles will likely be standard street light height, in the range of 20 to 50 feet. Outside lighting around the exterior of buildings and ancillary equipment would likely be attached to walls.

Spot lighting (up to 20 foot-candles) would be provided for purposes of localized area illumination for specific work activities such as the hydrogen manifold area. This lighting would be of higher intensity than wide-area lighting, but will be limited to specific areas and occasional usage. Emergency lighting would be provided for purposes of personnel egress and continuance of critical activities during emergency conditions. These instances are expected to be infrequent.

During construction, there would be some lighting associated with construction machinery. During operation of the Phase II project, the most visible points of illumination would be small, high-intensity anti-collision lights on the emission stacks to warn aircraft. These lights are intermittent and would be similar to warning lights present on the nearby WNP-3 and WNP-5 cooling towers.

Light and glare impacts upon nearby residents and travelers along Keys Road are not expected to be significant. Prior to the start of construction of Phase I, there were existing high-mast lights providing wide-area illumination of the industrial yards. Local residents are already accustomed to this local light source and the separation distance of approximately 3,375 feet provides a buffer zone for light falloff. The 25-foot-high wall with a vegetated berm located along Keys Road will reduce the light from the Phase II project. Vegetation located on the berm and scattered existing vegetation between the project site and residences would screen most of the lights. Additional screening is provided by high trees located along the residential road since the residences are set back an estimated 50 to 75 feet. In specific locations where glare or light spillover may impact Keys Road or nearby residences, lighting angles could be adjusted to minimize glare impacts, or supplemental light shields/vegetation could be used for extra screening.

3.12 Aesthetics

The assessment of impacts of the proposed Phase II project on visual quality included consideration of contrasts between current and proposed conditions for high or moderate levels of visual quality and high or moderate levels of viewer sensitivity as shown in Table 3.12-1. Following these guidelines, high sensitivity and a moderate change in visual quality could be considered potentially significant. Where sensitivity and visual change were both judged to be moderate, impacts are not considered potentially significant.

Table 3.12-1
Visual Impact Assessment Matrix

Sensitivity Level	Level of Change in Visual Quality (a)		
	High	Moderate	Low
High	PS	PS	A/N
Moderate	PS	A/N	N
Low	A/N	N	N

(a) N = Not Significant
A/N = Minor Adverse, Not Significant
PS = Adverse, Potentially Significant (without mitigation)

Visual impacts of construction activities of the Phase II project would be “not significant” regarding the overall landscape setting. Viewers throughout the Chehalis River Valley would not observe construction of the buildings or ancillary facilities, with the possible exception of a small portion of the emission stacks. For nearby residents and travelers on Keys Road passing adjacent to the site, the view of Phase I construction activity is already obstructed by the sound wall and vegetated berms. Construction of the Phase II project will become even less visible as the planting on the berm matures.

Once grading operations and exterior construction are completed, the site would be hydroseeded to enhance visual conditions. Equipment enclosure buildings and exterior tanks would be painted earth-tone beige and gray to reduce contrasts. The emission stacks would be painted to blend with the sky as seen from distant viewpoints.

Visual impacts of the constructed Phase II project upon the existing regional landscape are expected to be “minor adverse, not significant.” Even though project buildings and ancillary facilities would not be seen, a small portion of the emission stacks may be visible from some viewpoints in the Chehalis River Valley. The existing cooling towers constructed as part of the nuclear projects, juxtaposed against the horizontal profile of the background hills, are objects of attention for viewers looking across the open plain of the Chehalis River Valley. If visible, the presence of small portions of the emission stacks will be an additional, but very minor, element to the west of the existing and taller cooling towers of WNP-3 and WNP-5. Depending on the time of year and weather conditions, attention to the stacks could be more pronounced when a vapor plume is present.

The impact to local residents adjacent to the site is expected to be “minor adverse, not significant” due to overall visual compatibility of the project with the existing conditions. Even though the emission stacks and the higher plant structures would be visible, the proposed Phase II project would be screened by the 25-foot-high wall with vegetated berm along Keys Road. The buildings enclosing the turbine equipment would also reduce visual impacts. The screening berm is primarily intended to reduce the visual impacts to nearby residents, and would also reduce the visual impacts for travelers using Keys Road, even though the visual sensitivity for travelers is comparatively lower than other viewer types. Replacement transmission line towers will be constructed within the existing BPA right-of-way with negligible additional visual impact.

The Phase II will be constructed on an industrialized, developed site as part of the Satsop Combustion Turbine project. There are few nearby residences and few travelers using the adjacent Keys Road.

- The Phase II project will be located further east of the Phase I project. A screening berm has been built between the power plants and Keys Road as part of the Phase I construction, with a 25-foot-high noise wall behind the berm. This berm and noise wall screen the plant from viewers using Keys Road, and will screen all but the tallest portions of the plants from viewers at nearby residences.

- Equipment enclosure buildings and exterior tanks will be painted beige and gray to reduce contrasts.

- The two 200-foot-high emission stacks will be painted a light color to minimize contrast with the background.

3.13 Recreation

No recreational opportunities currently exist on or in the immediate vicinity of the site. The Phase II project is an expansion of the existing Phase I project and is located within the same site boundaries and would not impact recreational opportunities.

3.14 Historic and Cultural Preservation

There are no places or objects listed on, or proposed for, national, state or local preservation registers located on or next to the Phase II site. A cultural resources survey was performed as part of permitting for Phase I. The Phase II project is an expansion of the existing Phase I project and is located within the same site boundaries. Phase II would have no historic or cultural preservation impacts. Should any resources be identified during site excavation, work will halt until appropriate consultation with state and tribal officials has been made and a plan approved for the disposition of the resources.

3.15 Traffic and Transportation

This section is an extensive revision of transportation information presented in the November 2001 Application for Amendment 4 to the Site Certification Agreement. Specifically revised and added is information on the potential impacts of diverting the majority of the construction traffic to the Wakefield-Lambert interchange with SR 12. Presented below is information on existing traffic conditions and impacts related to transportation, including the following sections:

- Transportation Systems and Vehicular Traffic (Section 3.15.1)
- Waterborne, Rail, and Air Traffic (Section 3.15.2)
- Parking (Section 3.15.3)
- Movement/Circulation of People or Goods (Section 3.15.4)
- Traffic Hazards (Section 3.15.5)
- Mitigation Measures (Section 3.15.6)

3.15.1 Transportation Systems and Vehicular Traffic

This section identifies existing transportation facilities and traffic volumes in the vicinity of the proposed project and describes the potential traffic impacts due to construction and operation of the Phase II project.

3.15.1.1 Assumptions

After conversations with WSDOT and EFSEC in relation to this project, it was determined that this environmental analysis will focus primarily on the potential impacts from the construction of the Satsop CT Phase I and II projects. Operation of the two phases, even in combination results in only 42 employees operating on either two twelve-hour shifts or three eight-hour shifts resulting in a maximum of 27 employees on site at any one time. The relatively small number of employees during operation would result in little to no impact on traffic in the vicinity.

Additionally, any mitigation measures proposed to address the traffic impacts resulting from the construction of Phase I and II will be designed to take into account the temporary nature of the construction of Phase I and II (approximately two year duration for construction). Further, possible mitigation measures will consider first those measures that can be implemented quickly (prior to Phase I reaching it's peak in construction force – anticipated to occur in September-October, 2002 based on workforce projections) resulting in the most efficient movement of all vehicles to and through the Study Area.

3.15.1.2 Existing Conditions

3.15.1.2.1 Street Highway System. Figure 3.15-1 shows the major roadways in the area. State Route (SR) 12 is the predominant highway serving the plant site. SR 12 is a four-lane divided highway providing east-west access that extends from Aberdeen on the west to its intersection with SR 8 near Elma, then southeasterly to connect with Interstate 5 (I-5) north of Centralia. SR 8 continues east from Elma until it becomes US Highway 101 and connects to I-5. South of SR 8, SR 12 continues as a two-lane highway with varying width shoulders. The posted speed limit on SR 12 is 60 mph in the Elma to Montesano area.

Keys Road is a two-lane minor collector county arterial providing direct connection from SR 12 to the plant site and proposed project site. Keys Road is 24 feet in width with varying width shoulders (paved or gravel) and is stop sign controlled (one way on Keys Road) at its intersection with SR 12.

Access to the site is provided directly from Keys Road by a new access driveway to be constructed within the site boundaries. The asphalt surface of Keys Road is in good condition, and the posted speed limit is 35 to 40mph. The proposed plant site is located approximately 2.5 miles south of SR 12 along Keys Road.

The Wakefield Road corridor also provides access from SR 12 from the east to the project site. Wakefield Road connects SR 12 to Keys Road via Lambert Road and is rated for heavy vehicle (truck) use. Wakefield/Lambert Road is two lanes and the speed limit is 45 mph.

3.15.1.2.2 Existing Traffic Volumes. Study Area traffic volumes for 1999 were obtained from the Washington State Department of Transportation (WSDOT) 1999 Annual Traffic Report. These volumes were grown at a growth rate of 3 percent per year was used to bring projected traffic volumes to a year 2002 analysis base.

Traffic counts (including classification data) at the interchange intersection(s) of SR-12 and Wakefield Road were taken on March 27, 2002 for a period of 24 hours. Additionally, peak hour, manual turning movement counts were also conducted at both the eastbound and westbound interchange intersections. Specific data for this intersection has been forwarded to WSDOT and will be provided in the update to the Satsop Phase II transportation section for this project.

WSDOT conducted classification traffic counts and turning movement counts at Keys Road and SR-12 on March 27, 2002. These counts include traffic associated with construction of Phase I as well as traffic associated with other Development Park tenants (including Cascade and Safe Harbor). As of March 30, 2002, approximately 306 persons were employed in connection with Phase I construction and approximately 480 persons were employed by other Development Park tenants.

Traffic volumes (mainline volumes and intersection) are shown in Figures 3.15-2 and 3.15-3.

Figure 3.15-1 Primary Roadways in the Project Area

8-1/2 x 11 b/w

Figure 3.15-2 Existing Traffic Volumes

8-1/2 x 11 b/w

Figure 3.15-3 2002 Traffic Counts at Key Intersections

8-1/2 x 11 b/w

3.15.1.2.3 Existing Levels of Service. The worst levels of congestion and delay to motorists generally occur during the PM peak period. A measure of the relative congestion levels can be obtained by calculating the Level of Service (LOS) at intersections. Traffic operations at SR 12 and Keys Road as well as SR 12 and Wakefield Road were analyzed using the Transportation Research Board *Highway Capacity Manual* (the HCM) (TRB 2000) and 2000 *Highway Capacity Software* (HCS). This program uses the techniques presented in the 2000 HCM and produces a LOS rating based upon a scale ranging from LOS "A" (little or nor delay) to LOS "F" (extreme delays), with LOS "E" being capacity conditions. LOS "C" generally is considered adequate for rural intersections. These classifications account for such factors as truck volumes, roadway geometrics, turning movements, and other traffic-inhibiting factors. The results of these analyses for intersections without traffic signals generally overestimate actual conditions.
The LOS for unsignalized intersections is based on delay of each vehicle. Table 3.15-1 presents the delay used and definitions for levels of service at these types of intersections. Previously reserve capacity was calculated. The HCM has since set the standard for LOS calculations at delay per vehicle (measured in seconds).

Table 3.15-1
Level of Service Criteria for Unsignalized Intersections

Level of Service	Delay per Vehicle (seconds)	Expected Delay to Minor Street Traffic
A	< 10	Little or no delay
B	>10 and < 15	Short traffic delay
C	>15 and < 25	Average traffic delay
D	>25 and $\leq$ 35	Long traffic delay
E	>35 and $\leq$ 50	Very long traffic delay
F	>50	Even longer traffic delays

Source: TRB 2000 (HCM)

Keys Road (and to the north 4th Street) consist of one lane each providing movement in all directions. Keys Road is stop controlled in both the north and south directions. SR-12 consists of two lanes in each direction with a small left turn pocket in both the east and west directions. Additionally, there is a small acceleration pocket for left turning vehicles from 4th Street to SR 12.

For the intersection of Wakefield Road and SR 12, stop signs are located at the end of the off-ramps. Each off-ramp consists of two lanes to allow for left/through movement and right-turn movement. Wakefield Road is not stop controlled and widens to provide left turn/right-turn lanes when necessary at these two intersections.

Based on knowledge that the existing Phase I construction workforce works shifts from 7:30am-3:30pm or 7:30am-5:30pm, it was determined that to obtain an accurate snapshot of existing traffic, a three-hour peak period would be examined. Therefore, the hours of 6-9am and 3-6pm were evaluated for both the SR 12/Keys Road and SR 12/Wakefield Road intersections along with delay at each intersection for each time period and it's corresponding Level of Service. The directional volumes and subsequent delay and Level of Service calculations are shown in Table 3.15-2

Table 3.15-2
Existing Intersection Volumes and Level of Service

Location	Peak Hour	Northbound			Southbound			Westbound			Eastbound			Delay (sec)	LOS
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
Keys Road/ 4th Street*	6-7am	3	0	10	29	12	23	131	448	12	3	463	177	27.1	D
Keys Road/ 4th Street*	7-8am	10	4	22	29	12	30	16	628	8	6	568	51	22.3	C
Keys Road/ 4th Street*	8-9am	9	3	26	27	3	24	13	731	17	27	726	14	24.9	C
Keys Road/ 4th Street*	3-4pm	57	16	53	33	6	38	14	1029	29	26	864	7	453	F
Keys Road/ 4th Street*	4-5pm	27	10	20	22	11	27	10	852	38	30	769	3	47	E
Keys Road/ 4th Street *	5-6pm	66	19	63	26	10	15	5	737	37	26	788	17	112	F
Wakefield Rd EB on/off ramps+	6-7am	--	60	10	128	95	--	--	--	--	31	0	10	11.4	B
Wakefield Rd EB on/off ramps	7-8 am	--	82	32	141	69	--	--	--	--	40	0	14	11.8	B
Wakefield Rd EB on/off ramps	8-9am	--	88	14	121	81	--	--	--	--	58	0	11	11.9	B
Wakefield Rd EB on/off ramps+	3-4pm	--	62	46	209	110	--	--	--	--	69	2	19	15.6	C
Wakefield Rd EB on/off ramps	4-5pm	--	96	24	155	96	--	--	--	--	111	1	18	14.2	B
Wakefield Rd EB on/off ramps	5-6pm	--	95	70	97	185	--	--	--	--	109	3	31	13.5	B
Wakefield Rd WB on/off ramps+	6-7am	--	76	4	60	136	--	23	0	93	--	--	--	9.7	A
Wakefield Rd WB on/off ramps	7-8 am	--	115	9	62	170	--	49	0	151	--	--	--	10.2	B
Wakefield Rd WB on/off ramps	8-9am	--	50	3	32	41	--	15	0	52	--	--	--	8.9	A
Wakefield Rd WB on/off ramps+	3-4pm	--	178	14	91	226	--	12	0	57	--	--	--	10.7	B
Wakefield Rd WB on/off ramps	4-5pm	--	186	24	107	225	--	31	0	171	--	--	--	11.0	B
Wakefield Rd WB on/off ramps	5-6pm	--	194	19	91	250	--	32	0	168	--	--	--	11.0	B

+NOTE: Intersection turning movement breakdown for Wakefield Road was not available for the hours of 6-7am and 3-4pm. This time period falls outside the normal am and pm peak hour analysis. The peak 60-minute period was used to determine the turning movement counts and attributed to the total directional counts for these two time periods.

NOTE: For the Keys Road/4th Street Intersection, both the northbound and southbound directions were analyzed with one lane being used by all movements. Therefore, right-turning vehicles must also queue with left and through vehicles to exit the site.

NOTE: Traffic counts at both intersections were taken on March 27th, 2002. With Satsop Phase I in construction. Approximately ½ of the maximum construction force was in-place at this time.

Currently, the Wakefield Road/SR 12 intersection operates at acceptable levels of service (LOS A-C) at all times evaluated. The Keys Road/SR 12 intersection operates at acceptable levels of service (LOS C) during the morning period when most Phase I construction workers are arriving at the site, but operates at LOS E and LOS F during the evening periods when construction workers are going off shift.

The construction estimates of travel for the completion of the Phase I and Phase II projects, consecutively, is anticipated to increase the number of vehicles in the area during the PM peak hour by a maximum of 383 vehicles. This maximum of 383 vehicles is anticipated in September-October 2002 with 357 vehicles associated with Phase 1 construction and the remaining 26 vehicles related to the Phase II construction.

Based on a Satsop worksite survey, it was determined that the current workforce was made up of approximately 80% individuals traveling to/from the Olympia area with the remaining 20% traveling to/from the Aberdeen area. Future workforce percentage was assumed to follow these trends.

After the construction Phase Is completed, the overall traffic increase due to the operation of the two plants is minimal and does not affect the individual LOS movements adversely.

3.15.1.2.4 Pedestrian Bicycle Facilities and Transit. The streets and highways serving the plant site have neither pedestrian nor bicycle facilities. Grays Harbor Transit Bus route 40 currently operates along SR 12 providing service between Olympia and Aberdeen. This route operates six times a day on weekdays and three times a day on weekends.

3.15.1.2.5 Accident Experience. Accident reports for the intersection of SR 12 and Keys Road were obtained from WSDOT. From January 1, 1998 to December 31, 2000, 13 accidents were reported, resulting in 14 injuries and no fatalities. These accidents were spread out with 4 of the total 13 happening in the morning hours (midnight to noon) and the remaining 9 occurring in the afternoon/evening hours from 1 PM to midnight. Only the hour of 4 to 5 PM recorded more than one accident during its 60 minutes; two accidents within the 3-year period were recorded in the PM peak hour period. Four accidents were reported in 1998, five in 1999, and four in 2000. Two total accidents were alcohol-related (one in 1999 and one in 2000). Table 3.15-3 lists the accident characteristics during the past 3 years for the intersection of SR 12 and Keys Road.

Table 3.15-3
Accident Analysis for SR 12/Keys Road Intersection

Year	Number of Total Accidents	Type of Accidents	Number of injuries	Collision Type
1998	4	Failure to yield (2) Inattention (1) Unknown (1)	1 0 0	1 rear-end/1 unknown unknown unknown
1999	5	Failure to yield (2) Asleep (1) DWI/failure to yield (1) Other (1)	9 (6 & 3 respectively) 1 1 0	2 enter at angle rear-end enter at angle hit fixed object
2000	4	Failure to yield (1) DWI (1) Unknown (2)	2 1 0	Enter at angle Hit fixed object 1 fixed object/1 unknown

Source: McBee 2001

3.15.1.2.6 Future Plans and Projects. Discussions with the WSDOT office in Aberdeen have indicated that plans for an additional interchange on SR 8 in the vicinity of McCleary is nearing completion, and construction is expected to begin in 1 to 2 years (Hart 2001). In addition, the Satsop River Bridge retrofitting is expected to occur in the next few years.

Further, the construction of a “short-cut” across Lambert Road north of the WPPSS Access Road is slated for construction summer 2002.

3.15.1.3 Impacts

3.15.1.3.1 Construction. Traffic impact analyses were based on overlapping construction of Phase I and Phase II. The worst-case peak construction workforce was assumed to be 539 for the two plants (see Figure 3.15-4). This assumes that the construction startup of Plant II would begin approximately 7 months prior to the completion of Plant I. This schedule will allow maximum use of the first plant’s construction workforce. Under those circumstances, the peak construction workforce would be decreased. Therefore, the traffic estimates and associated impact evaluations presented below are very conservative. Future trip requirements were distributed to the existing roadway system based on existing travel patterns. A review of existing traffic volumes at the SR 12/Keys Road intersection indicates that approximately 94 percent of the total entering traffic on SR 12 at this intersection remains on SR 12 (as through traffic), four percent exits to northbound Keys Road, and 2 percent exits to the south on Keys Road. The existing minor road traffic entering onto SR 12 distributes evenly to the west and east from either the north or south approach. Using historic traffic counts in the WSDOT *Annual Traffic Report* (WSDOT 1999), a 3 percent annual growth factor was assumed to predict future traffic volumes. Neither construction nor operation will require new roads or improvements to existing roadways.

Figure 3.15-5 presents the estimated traffic increases during project construction for the Keys Road intersection with SR 12, assuming traffic is not redirected to Wakefield Road. These estimates were calculated based on the following assumptions:

- The construction workforce peak will occur in 2002.
- The auto occupancy rate will be 1.1 individuals per car.

Use of these assumptions resulted in a conservative worst-case analysis of traffic increases. The peak of the workforce at the plant site is expected to occur for approximately 4 months in late 2002, from about Month 13 through Month 16 of construction. However, as shown on Figure 3.15-4, the workforce will range from approximately 500 to 540 during approximately 4 months of construction. With the two phases of construction, there are two peaks of construction traffic, with the first peak being higher due to the overlap with Phase II construction. As discussed above, these workers will be utilized for work on Phase II as they become available at the completion of work on Phase I of construction (see Table 3.15-4).

Figure 3.15-4 Projected Craft and Staff Requirements for Phase II (Shown Overlapped with Phase I)

8-1/2 b/w

Figure 3.15-5 Estimated AM/PM Peak Traffic Volumes at Keys Road/SR 12

8-1/2 b/w

Table 3.15-4
Traffic Projections and LOS Analysis

	Increase in PM Peak Hour Trips	LOS Northbound at Keys Road
2001 (Phase I only)	357	F
2003 (Phase I and Phase II)	383	F

Source: TRB 2000

Using these worst-case traffic estimates, an LOS analysis for the intersection of SR 12 and Keys Road was performed for the AM and PM peak assuming overlapping construction of the two plants. As described in Section 3.15.1.2 (Existing Conditions), Keys Road currently operates at LOS E and C in the morning and a LOS F in the evening. In comparison, the Wakefield Road intersection with SR 12 currently operates at LOS A, B and C in the morning and evening.

Keys Road/SR 12 Intersection Analysis

The Keys Road intersection with SR 12 is the closest highway intersection to the site. Unless traffic is directed elsewhere, it is assumed that most construction workers would use the Keys Road intersection. During the peak workforce period of construction, the eastbound left turn at the Keys Road intersection would likely operate at LOS D in the AM peak and LOS F in the PM peak, with a delay of up to 7½ minutes per vehicle. Table 3.15-5 lists the existing and anticipated delays per vehicle of the eastbound, westbound, northbound, and southbound left-turn lanes for this intersection. Calculations based on projections of 1993 traffic counts to 2001 (at a rate of 3 percent per year) were used as the baseline. Since the construction workers for Phase I will be shifted to work on Phase II as they become available, there is only a slight change in LOS based on whether or not Phase II is constructed. This difference is due to the specialization of some sorts of work and their availability in the overall construction process.

Table 3.15-5
Anticipated Levels of Service at Keys Road and SR 12

	Eastbound		Westbound		Northbound		Southbound	
	Left turn		Left turn		Left-turn		Left-turn	
Condition	LOS[a]	Delay[b]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]
Existing (2002 counts including current Phase I construction)	AM = B PM = B	10.1 11.8	AM = A PM = B	9.2 11.1	AM = C PM = F	18.2 453.4	AM = C PM = F	22.3 132.7
2002 with concurrent construction of Phases I and II	AM = B PM = B	10.1 11.8	AM = B PM = B	10.4 11.1	AM = D PM = F	29.1 >1000	AM = E PM = F	46.5 159.9

(a) See Table 5.2-1 for LOS criteria.
(b) Delay is measured in seconds.

Both with and without the construction of Phase II, during the peak hour, the eastbound and westbound movements continue to operate at LOS "B" and "A," respectively. The left turn movements in the northbound and southbound directions deteriorate from LOS "D" and "E" respectively to LOS "E" and "F" with the construction of either one or both of the Phases. These degradations of LOS would be limited to the construction phase of the project. It is anticipated that with the operation of Phase I or Phase I and II, the LOS at this intersection will not be affected significantly.

Short-term transportation impacts from construction of the proposed project will result from the construction work in street rights-of-way and construction vehicle traffic. It is anticipated that 326 additional PM peak hour trips will be attributable to the construction of Phase I and II.

The peak construction workforce for the plants will result in the addition of approximately 383 PM peak hour vehicular trips per day, attributable to the construction of Phase I and Phase II impacting the roads serving the plant site. This situation will last for approximately 4 months during the overlap of Phase I peak traffic with the initiation of Phase II with the workforce dropping to between 212 and 404 workers for a period of seven months between the peaks. The second construction activity peak for Phase II will be slightly lower than that for Phase I. (See Figure 3.15-4) Because Phase II will utilize workers as they become available from work being completed by Phase I, minimal overall increases in workers will be seen. The length of time that construction workers will be in the area will increase over Phase I but the overall number of workers will remain constant. Therefore, the impacts already shown for Phase I Report will remain and likely impact the area for a longer period of time, but minimal to no additional impacts will be seen.

During the construction phase of Satsop Phase I and Phase II, traffic to/from the proposed site will increase, affecting LOS. If most construction traffic were to use the Keys Road/SR 12 intersection, the northbound left-turn lane will deteriorate in both the am and pm peak periods from LOS “C” to LOS “D” in the am period and from remain at LOS “F” in the pm period. The impacts of Phase II will not increase the severity of deterioration over the construction impacts of Phase I but will increase the length of time the additional traffic (associated with construction) will be present at this intersection. The resulting LOS “F” condition with the construction would result in a net increase in delay of over 1,000 seconds (approximately 16 minutes and 45 seconds) per vehicle during the construction phase. The southbound lane is also expected to remain at LOS “F” both with and without Phase II in operation; however, the delay per vehicle increases approximately 27 seconds per vehicle resulting in a delay of approximately 2 minutes 45 seconds at this location for each vehicle. All other movements at the intersection will continue to operate within desired limits.

It should be noted with the construction of other facilities in the area (e.g., Safe Harbor, Boise Cascade, etc.) currently, the delays shown above may be less then actually observed in the coming months. The projections above only account for increases in construction traffic associated with the Satsop Phase I and Phase II project(s).

Wakefield Road/SR 12 Interchange Analysis

An analysis of the SR 12/Wakefield Road interchange was conducted to determine potential level of service changes caused by diverting the Phase I and II construction traffic to this interchange as a mitigation measure for impacts to Keys Road. Table 3.15-6 and Figure 3.15-6 show the results of this analysis assuming all traffic for the Satsop Phase I and Phase II were diverted from the Keys Road intersection and forced to utilize the Wakefield Road during the am and pm peak hours.

Table 3.15-6
Anticipated Levels of Service at Wakefield Road and SR 12

Condition	Eastbound Left turn		Westbound Left turn		Northbound Left-turn		Southbound Left-turn	
	LOS[a]	Delay[b]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]
Eastbound on/off ramps	AM = B PM = C	13.8 22.8	N/A N/A	N/A N/A	AM = -- PM = --	-- --	AM = A PM = A	7.7 9.3
Westbound on/off ramps	N/A N/A	N/A N/A	AM = C PM = B	22.3 11.8	AM = -- PM = --	-- --	AM = A PM = A	7.7 8.1

(a) See Table 3.15-1 for LOS criteria.
(b) Delay is measured in seconds.

This analysis shows that the Wakefield interchange could handle the additional construction traffic without the need for traffic improvements such as signals or other mitigating measures.

Construction traffic to and from the plant site for Phase I and II will represent about 17 percent of the total peak-hour traffic on the roads in the area. The LOS on the roadways will decrease due to construction of the project, but these decreases will be temporary.

Trucks

It is anticipated that 55,000 cubic yards of cut and fill will need to be brought/taken from the site. Based on the trucking performed for the Phase I site preparation, the average truck trips per day will be 40 trips/day with a load of approximately 25 cubic yards. Site preparation is anticipated to take two to two-one/half months depending upon weather. Site preparation is scheduled for six days per week, with work also occurring on Sunday when the weather is dry. For Phase I, trucks were normally operating from 7:00 a.m. until 6:00 p.m. during scheduled work days. This equates to approximately 3.6 trucks per hour, or a total of 7.2 trips in and out per hour.

It has not been determined where the soil will be taken. For the purposes of our level of service analysis, we assumed two "worst case" assumptions: (1) that all the soil would be excavated and filled in one month; and (2) that all trucks are traveling between the site and the Aberdeen area. This equates to approximately 5,000 trucks for a month or 28 trucks per hour of operation. Truck access to the site, under this scenario, is a right-turn from eastbound SR 12 onto Keys Road and a left-turn from Keys Road to SR 12. These truck numbers were included in the analysis of the intersection of SR 12/Keys Road but are overly conservative as the site could not accommodate this number of trucks per hour.

3.15.1.3.2 Operation. The analysis conducted for the operation of Phase II of the proposed project assumed that operation of the proposed plant would generate traffic by employees and other services associated with the plant only.

During the operation of the two phases, a total of 42 people will be employed, with a maximum of 27 employees on site at the same time. Operation will involve either two 12-hour shifts or three 8-hour shifts.

Table 3.15-5 lists the existing and anticipated delays of the northbound and southbound left-turn lanes for the SR 12/Keys Road intersection, both with and without construction in 2002. With the minimal increase in traffic associated with the operation of the two phases, significant changes to LOS at the SR 12/Keys Road intersection will not change.

Figure 3.15-6 Estimated AM/PM Peak Traffic Volumes at Wakefield Road/SR 12

During major maintenance of the plant (assuming similar construction and maintenance timelines as outlined in Phase I), an additional 50 people will be on site for approximately 28 days during the day shift. The maintenance-related traffic will not result in a reduction of the LOS on the roads serving the site. Adequate parking will be provided for both the operations and major maintenance staff.

3.15.2 Waterborne, Rail, and Air

3.15.2.1 Transport by Rail

A combination of rail and truck transport will be used to ship some of the project-related equipment and materials from the manufacturers to the site area. The equipment shipped by rail will include the combustion turbine and the combustion turbine generator, the steam turbine and the steam turbine generator, transformers, and the heat recovery steam generator (HRSG). The heaviest single load will be the HRSG modules, which will weigh approximately 221 tons each. The following description of planned rail and truck transport is based on preliminary evaluations of rail and roadway facilities and on estimates of the volume and number of shipments. The Certificate Holder will provide EFSEC with appropriate additional information as final transportation plans are developed.

Items shipped by rail will be delivered to the existing Elma rail siding located approximately 3 miles northeast of the site. The existing facilities are adequate for project-related needs, and there is no need to develop additional rail access or rail facilities for the project. Shipment by rail will require approximately 25 to 30 railcars over a 3- to 6-month period (for materials to construct both phases of the project). From the rail siding at Elma, heavy haulers will be contracted to deliver the items to the laydown area at the plant site using a route that follows SR 12 from Elma to Keys Road to the plant site, or using the Wakefield/Lambert corridor. These roads have the capacity to handle the size and weight of the trucked equipment and materials.

Trucks used for this transport will have the required number of axles to ensure compliance with highway and bridge design loading. The contracted hauling firms will be licensed to operate in the state and will be responsible for obtaining all applicable permits and licenses.

3.15.2.2 Waterborne and Air Transport

Neither phase of the project will use waterborne or air transport during construction or operation, with the possible exception personnel transport on commercial flights and the use of commercial couriers that would use existing private or commercial flights for occasional small deliveries.

3.15.3 Parking

3.15.3.1 Power Plant Construction

No parking will be permitted on the streets and roads serving the plant site. During construction (of both phases), parking will be available on the existing construction laydown located west of Keys Road. This large area has been graveled and graded for use as a construction laydown area for nuclear projects WNP-3 and WNP-5. Approximately half of the area currently contains asphalt overlays. The laydown area has graveled internal roadways and access to and from Keys Road. As described in Section 3.15.2.1, the worst-case construction workforce peak would be 505 workers, although the actual number expected with overlapping of the construction periods for the two plants is slightly less than that. Assuming an occupancy rate of 1.1 workers per car, the expected peak workforce would require approximately 460 parking spaces. Assuming an average of 400 square feet per parking space, including access area, the total size of the parking area would be approximately 184,000 square feet. The planned parking area has sufficient space for use as a laydown area and for accommodating this number of vehicles.

Runoff from the existing construction laydown area is controlled by the Certificate Holder in accordance with the requirements of its existing Environmental Protection Control Plan.

3.15.3.2 Operation

Parking will be provided at the plant site and additional parking will be provided at the construction laydown area located on the west side of Keys Road. This amount of parking will be sufficient for the maximum of 26 employees who will be on the site at any one time during full operation of both plants. Runoff from these parking areas will be controlled in accordance with the requirements of the existing Environmental Protection Control Plan.

3.15.4 Movement/Circulation of People or Goods

Construction of the proposed project will result in temporary and minor additional delays in traffic during delivery of oversized or heavy loads. The delivery of material will be constricted to non-peak hours and at the most results in 7 to 8 truck trips per hour for the duration of approximately two to two one-half months. The trucks are anticipated to be traveling to/from the Aberdeen area and will access the site via eastbound SR 12 and southbound Keys Road. With this routing, the impact due to deliveries will be seen when these trucks return to base via northbound Keys Road, left, to westbound SR 12. During operation, the project will not have an impact on the movement or circulation of people or goods.

During construction and operation, the public will not be permitted in the areas associated with the power plants, including the transmission line right-of-way.

3.15.5 Traffic Hazards

3.15.5.1 Hazards to Traffic

The contractors will prepare a traffic control and parking plan that will describe procedures to be followed during construction of Phase II and associated facilities. This document will follow standard procedures for safe accomplishment of construction activities such as transporting heavy equipment along roadways, establishing detours, and the use of flaggers. As a result of implementation of the procedures in this plan, construction of Phase II is not expected to cause hazards to the existing traffic. However, the increase in traffic volumes on the adjacent street network would naturally increase the probability of an accident occurring.

As discussed in Subsection 3.15.1.2.5, 13 accidents, resulting in 14 injuries and no fatalities, occurred at the SR 12/Keys Road intersection during the 3-year analysis period. Typically, an unsignalized intersection with 5 or more accidents per year or a signalized intersection with 10 or more accidents per year is considered a high-accident location (HAL) and warrants analysis for improvements (WSDOT 2001). The intersection of SR 12 and Keys Road was placed on the HAL list in 2000 in response to an average of three accidents per year for a 2-year period along with other criteria (e.g., severity of accidents, etc.). Presence on the list does not mean that improvements are necessary, but is an acknowledgement that conflicts occur. It is possible that this intersection could be removed from the HAL list for 2001-2002 depending on the number of accidents in those 2 years, but with the increase in traffic due to other construction in the area, this is unlikely. With the above proposed mitigation measures to route traffic to the Wakefield Interchange, it is not predicted that the construction traffic will have a significant impact on the accident rates at the Keys Road and SR 12 intersection.

3.15.5.2 Fuel and Waste

3.15.5.2.1 Fuel Oil. The project will use natural gas. Small amounts of fuel oil will be used for the backup generators and fire-water pumps.

3.15.5.2.2 Waste Products. The Site Certification Agreement for the Satsop CT Project stipulates waste management procedures in accordance with state regulations. A Comprehensive Dangerous Waste Management Program fulfilling all applicable regulatory requirements is in place for the Satsop CT Project site. This includes procedures for waste designation, labeling, storage, handling and disposal procedures; record keeping; inspection; contingency planning; management oversight; and transportation. This program will be applied to Phase II.

Hazardous materials will be transported by a licensed hazardous waste transporter, and when appropriate, hazardous materials will be disposed of at an approved and licensed disposal facility.

3.15.6 Mitigation Measures

Without mitigation, traffic associated with Phase I and II construction, together with existing traffic from other sources, could degrade the LOS at the intersection of SR 12 and Keys Road to unacceptable levels. Prior to construction of Phase I, a traffic management plan was submitted to EFSEC for review and was approved. Since that time, construction of Phase I has begun as well as construction of another development in the area (e.g. Boise Cascade, etc.). The total increased construction work force, and subsequent workforce traffic in the area continues to increase resulting in worsening operation and degraded LOS at this intersection.

With this in mind, additional possible mitigation measures were proposed for Satsop Phase II, specifically the use of the SR 12/Wakefield Road intersection for access/egress to the site. This intersection (SR 12/Wakefield Road) has additional capacity and can accommodate the entire peak construction force traffic for both Phase I and Phase II without degrading to unacceptable levels. With the temporary nature of the construction impacts associated with Satsop Phase I and II, it was determined that any mitigation should be representative of the temporary nature of impacts as well as be able to be implemented quickly to take advantage of the short timeframe prior to the peak construction workforce for Phase I anticipated to occur in September-October 2002). Possible mitigation measures were discussed with WSDOT, Grays Harbor County and EFSEC. Below is an accounting of the types of measures considered and the decisions regarding their use.

3.15.6.1 Proposed Mitigation Measures

All parties agreed that if all of the Satsop construction traffic were directed to the Wakefield Interchange, the project would not cause significant impacts to the Keys Road/SR 12 intersection. However, WSDOT expressed concern about how to enforce the redirection of the traffic and assure that the construction traffic use the Wakefield interchange.

The following mitigation measures have been discussed with the agencies and agreed to by the Certificate Holder as a means of redirecting the traffic to the Wakefield interchange:

- Duke Energy and Duke/Fluor Daniel have agreed to send a letter to all of their construction workforce requesting that all employees cease from making left turns onto Keys Road from SR 12. The letter also requests that all traffic coming from the east should cease using Keys Road and instead use the Wakefield-Lambert corridor. This letter was provided to the construction workforce on April 12, 2002, and a copy is provided as Appendix A to this Environmental Report. WSDOT has agreed to meet with other area employers (e.g., Boise Cascade, Safe Harbor) to request that they take similar actions to reduce traffic at the Keys Road/SR 12 intersection.

- Duke Energy and Duke/Fluor Daniel have agreed to meet with each of the trades working on the Satsop project to explain the safety concern with the Keys Road/SR 12 intersection, and to request their assistance and cooperation in routing the traffic to the Wakefield interchange. This was done on April 12, 2002.

- Grays Harbor County has determined that it is within their regulatory authority to prohibit left turns from the Satsop construction parking lot onto Keys Road during specified hours of the day. Grays Harbor County will prepare two signs, to be posted at each of the exit driveways from the construction parking area, stating "no left turns from 3:00 – 6:00 pm". The exact wording and the hours will be determined in discussion with WSDOT following a review of the traffic count information currently being gathered by WSDOT. By prohibiting left turns, traffic will be directed to the right, to the Wakefield/Lambert Road corridor. Grays Harbor County will meet with the Duke/Fluor Daniel Safety Officer prior to installing the signs and coordinate the installation of the signs. The direction of traffic flow will be monitored by the Duke/Fluor Daniel Safety Officer.

- Grays Harbor County has agreed to move the stop sign currently located at the intersection of Keys Road and Lambert Road to allow free movement of traffic between these two roads to make use of the Wakefield/Lambert Road corridor more convenient. Traffic from the haul road will be required to stop and yield the right-of-way. To assist the County, WSDOT has agreed to prepare a signing plan to alert traffic that the stop sign location has been revised. It is estimated that this plan will be provided to the County during the first week of May.

- If, following the posting of no left turn signs at the construction exit driveways, the WSDOT traffic counts and visual observation do not show voluntary compliance with the written request from Duke Energy and Duke/Fluor Daniel to its workforce and compliance with the signs, the Duke/Fluor Daniel Safety Officer will be asked by EFSEC to manually direct traffic at the end of each work shift toward the Wakefield/Lambert corridor.

- If the manual redirection of traffic by the Duke/Fluor Daniel Safety Officer fails to achieve the desired rate of compliance, a request will be made by EFSEC to have a Grays Harbor uniformed traffic patrol officer stationed at or near the site to enforce the "no left turn" sign. The duration will be at the judgment of the Grays Harbor County Sheriff's Department. Arrangements for reimbursement of costs will be between Grays Harbor County and Duke Energy.

If, despite all of the above efforts to direct the traffic to the Wakefield/Lambert Interchange, these measures fail and a substantial amount of the Satsop construction traffic continues to use Keys Road/SR 12 and the expected level of service degradation occurs as a result of that traffic, then the next step would be to consider physical changes to the Keys Road/SR 12 intersection. These changes would be to either physically prevent the left-turn movement or to improve the intersection to provide safe operation and turning.

WSDOT's preference, if the issue comes to this point, is a physical rebuilding of the west bound lanes of SR 12 at the Keys Road and the widening of the turning radius for vehicles turning eastbound on SR 12 from Keys Road. Both are intended to provide havens for vehicles turning onto the highway to try to make the turning movement safer. The initial cost estimate for this work was estimated by WSDOT in mid-April to be approximately $450,000 and work would take four to six months depending upon the design and environmental process.

Duke Energy does not disagree that WSDOT's proposed intersection improvements should be made to improve safety. However Duke Energy disagrees that this should be done at the sole cost of the Satsop CT project rather than shared by those contributing to the increased traffic. The Satsop construction workforce currently represents less than one-half of the total workforce[4] in the Satsop Development Park area with the remaining workforce coming from Safe Harbor, Boise Cascade, other smaller companies, and the Grays Harbor Public Development Authority (PDA). The economic development plans for the area are to increase the number of businesses at the Satsop Development Park with the goal of 5000 workers in a ten year period. In contrast, the Satsop construction period, for both Phases I and II, will be over in approximately two years, and the operation workforce would be approximately 44 people spread over a 24-hour period.

In any event, the incremental mitigation measures outlined above should be implemented and their effectiveness evaluated before expensive intersection improvement projects are considered.

3.15.6.2 Additional Mitigation Measures That Were Considered But Are Not Proposed

A number of other measures were also considered and discussed with EFSEC, WSDOT, and Grays Harbor County. The following summarizes the measures and the reasoning for not proposing them as mitigation measures:

- ***Installation of a traffic signal at SR 12/Keys Road.*** Preliminary analysis calculated the LOS at this intersection currently operating at a LOS F. With the installation of a signal at this intersection, the LOS drops to acceptable levels. Because of the proximity of this intersection to other signalized intersections as well as the speed limit and functional classification of SR 12, it is undesirable to place a signal at this intersection. A signal would disrupt the continuous flow of traffic in the eastbound/westbound direction and the cost is prohibitive for a temporary construction impact.

- ***Use of enforcement personnel to direct traffic at the SR 12/Keys Road intersection.*** Again, this would result in a more effective movement of vehicles to/from Keys Road but would result in additional delays in the eastbound and westbound directions. Further, safety of enforcement personnel would be imperative and with the configuration of this intersection, two individuals would be necessary (one for eastbound and one for westbound traffic) at the minimum. This alternative is similar to the installation of a signal and has the same negative impacts with the addition of possible safety concerns.

- ***Signing Keys Road as a right-turn only (either for all times or during peak hours) onto SR12.*** This possible mitigation measure would be difficult to enforce and may result in

[4] As of the end of March 2002, there was a total workforce of 786 people at the Satsop Development Park, with 306 of those working at the Satsop CT project site.

additional safety concerns. Further the free movement of residents along Keys Road to/from their homes is necessary.

- ***Placement of a gate or other blocking mechanism to prevent the use of Keys Road (predominantly in the northbound direction during the pm peak hour) to Satsop Phase I and II construction workers during peak periods.*** This possible mitigation measure was analyzed to determine whether it was possible to “force” Satsop construction workers to utilize Wakefield Road while still providing access to residents along Keys Road (hence the gate). The employment of an individual would be necessary to allow for use of Keys Road by residents.

- ***Placing a traffic signal at the top of the westbound exit ramp from SR 12 onto Wakefield Road.*** The levels of traffic with the redirected construction traffic do not warrant the need for a signal.

- ***Using a flagger during AM peak hours to be located at the top of the westbound exit tamp from SR 12 onto Wakefield Road (in lieu of a traffic signal).*** The levels of traffic with the redirected construction traffic do not warrant the need for a flagger.

- ***Relocating the stop signs at the top of the westbound exit ramp from SR 12 onto Wakefield Road to allow free movement from the ramp.*** This is not warranted with the estimated level of traffic.

- ***Changing the location of the stop sign at the intersection of Wakefield Road and Lambert Road to allow free movement to and from the west on Lambert Road, stopping the traffic coming from South Bank Road.*** Grays Harbor County has decided to wait on this until they have the opportunity to observe the change in construction traffic levels.

- ***Transit use for construction workers.*** Under this measure, a park-and-ride lot would need to be established or located for construction workers who would then be taken by transit to the job site. To successfully reduce construction traffic impact at Keys Road/SR 12, requires two park-and-ride lots, one to the east and one to the west to construction traffic. This could have significant cost implications to the construction contract because workers would likely have to be paid from the time they get on the bus. Moreover, such a measure appears to be unwarranted given the adequacy of the roadway capacity leading to the site, the adequacy of the Wakefield interchange, and the adequacy of available onsite parking.

3.16 Public Services

Because no extensive demand on any public service or utility is anticipated, and a traffic control plan will be implemented, the overall impact to the public services and utilities attributable to construction is expected to be minor and short-term. Operation of Phase II will not have significant adverse impacts on existing public services in the project vicinity. Current Satsop CT staff have and new staff will be trained for handling onsite emergencies, including fire and medical, and will provide the first line of response. No effect on schools in the project vicinity is expected because of the relatively small Satsop CT staff.

3.17 Utilities

Electricity and water are currently available at the site. As part of Phase I construction, natural gas, refuse service and septic services will be made available at the site. Sanitary sewer service is not available. The project will include a septic system and leach field for each plant, constructed and operated in accordance with applicable regulations and will not affect the existing septic systems.

4.0 REFERENCES

These references are in addition to those included in the Application and SEPA Expanded Checklist.

Greenhouse gas references:

Charles River Associates 2002. *Greenhouse Gas Offset Strategy and Plan: Chehalis Generation Facility*. March 6, 2002.

DOE/EPA 2000. *Carbon Dioxide Emissions from Generation of Electric Power in the United States*, U.S. Department of Energy and Environmental Protection Agency, July 2000.

EIA 1998. *Impacts of the Kyoto Protocol on U.S. Energy Markets and Economic Activity*. Energy Information Agency. 1998.

EPA 2001. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-1999*. U.S. Environmental Protection Agency. April 2001.

IEA 2001. *Energy Technology and Climate Change: A Call to Action.* International Energy Agency.

IPCC 2001a. *Technical Summary, Climate Change 2001: Scientific Basis*. Intergovernmental Panel on Climate Change.

IPCC 2001b. *Technical Summary, Climate Change 2001: Mitigation*. Intergovernmental Panel on Climate Change.

Jones & Stokes 2002. *Application Review and Threshold Analyses: Satsop Combustion Turbine Project*. Phase II, Report prepared for Energy Facility Site Evaluation Council. March 6, 2002.

Kerstetter, James D., 1999. *Greenhouse Gas Emission in Washington State: Sources and Trends*, Washington State Community Trade and Economic Development. August 1999.

Montgomery, W. David, 2000. *Greenhouse Gas Emission Offsets and Natural Gas-Fired Combined Cycle Combustion Turbines.*

Montgomery, W. David, 2001a. Prefiled Testimony submitted to the Washington Energy Facility Site Evaluation Council. *In re Application No. 99-1*. 2001.
Montgomery, W. David, 2001b. Prefiled Rebuttal Testimony submitted to the Washington Energy Facility Site Evaluation Council. *In re Application No. 99-1*. 2001.

NAS 2001. *Climate Change Science: An Analysis of Some Key Questions*. National Academy of Sciences, National Academy Press.

OTED 2001. *2001 Biennial Energy Report*. Washington State Office of Trade & Economic Development. January 2001.

White House 2002. *Fact Sheet: President Bush Announces Clear Skies & Global Climate Change Initiatives*. February 14, 2002.

Fisheries References

Mantua, N.J., S.R. Hare, Y. Zhang, J.M. Wallace, and R.C. Francis, 1997: A Pacific decadal climate oscillation with impacts on salmon. Bulletin of the American Meteorological Society, Vol. 78, pp 1069-1079.

Washington Department of Ecology, 1976, Water Resources Program in the Chehalis River Basin, WRIA-22 and 23 (Chapter 173-522 WAC), dated March 10.

APPENDIX A

Letter from Duke Energy to Facility Employees, April 2002